EDISON
Electric Institute
BULLETIN

In Two Sections — Section One

MARCH, 1935

STATISTICAL DATA OF THE ELECTRIC LIGHT AND POWER INDUSTRY

Compiled by the Edison Electric Institute—Covers 100% of the Industry

ANNUAL DATA YEAR 1934

	1934	1933	%
Kilowatt-hours Generated* (net)			
By Fuel	53,291,098,000	47,476,277,000	+12.2
By Water Power	31,241,055,000	31,782,810,000	− 1.7
Total Kilowatt-hours Generated	84,532,153,000	79,259,087,000	+ 6.7
Additions to Supply			
Energy Purchased from other Sources	2,162,226,000	2,046,985,000	+ 5.6
Net International Imports	882,877,000	605,852,000	+45.7
Total	3,045,103,000	2,652,837,000	+14.8
Deductions from Supply			
Energy Used in Electric Railway Departments	652,523,000	698,815,000	− 6.6
Energy Used in Electric and Other Departments	1,360,609,000	1,203,608,000	+13.0
Total	2,013,132,000	1,902,423,000	+ 5.8
Total Energy for Distribution	**85,564,124,000**	**80,009,501,000**	**+ 6.9**
Energy Lost in Transmission, Distribution, etc.	**14,782,344,000**	**14,255,893,000**	**+ 3.7**
Kilowatt-hours Sold to Ultimate Consumers	**70,781,780,000**	**65,753,608,000**	**+ 7.6**
Number of Customers (Average for Year)*			
Domestic	20,265,890	19,800,172	+ 2.4
Commercial—Small Light and Power (Retail)	3,705,712	3,671,102	+ 0.9
Commercial—Large Light and Power (Wholesale)	526,550	528,570	− 0.4
Municipal Street Lighting	38,377	37,166	−
Street and Interurban Railways	637	637	−
Electrified Steam Railroads	27	27	−
Municipal and Miscellaneous	28,752	29,379	−
Total Number of Ultimate Consumers	24,565,945	24,067,053	+ 2.1
Sold to Ultimate Consumers (kw-hrs)			
Domestic Service	12,797,635,000	11,960,256,000	+ 7.0
Commercial—Small Light and Power (Retail)	13,150,738,000	12,474,822,000	+ 5.4
Commercial—Large Light and Power (Wholesale)	36,918,569,000	33,722,373,000	+ 9.5
Municipal Street Lighting	2,203,484,000	2,213,007,000	− 0.4
Street and Interurban Railways	4,352,119,000	4,003,876,000	+ 8.7
Electrified Steam Railroads	702,664,000	661,387,000	+ 6.2
Municipal and Miscellaneous	656,571,000	717,887,000	− 8.5
Total to Ultimate Consumers	70,781,780,000	65,753,608,000	+ 7.6
Revenue from Ultimate Consumers			
Domestic Service	$677,697,300	$656,570,100	+ 3.2
Commercial—Small Light and Power (Retail)	511,681,700	499,684,400	+ 2.4
Commercial—Large Light and Power (Wholesale)	495,657,100	465,190,800	+ 6.5
Municipal Street Lighting	92,984,400	94,269,500	− 1.4
Street and Interurban Railways	37,838,400	36,358,900	+ 4.1
Electrified Steam Railroads	6,725,800	6,549,900	+ 2.7
Municipal and Miscellaneous	14,461,300	14,792,000	− 2.2
Total from Ultimate Consumers	$1,837,046,000	$1,773,415,600	+ 3.6
Important Factors			
Per cent of Energy Generated by Waterpower	37.0%	40.0%	
Average Pounds of Coal per Kilowatt-hour	1.45#	1.45#	
Domestic Service (Residential Use)			
Average Annual Consumption per Customer (kw-hr)	631	604	+ 4.5
Average Revenue per kw-hr (cents)	5.30¢	5.49¢	− 3.5
Average Monthly Bill per Domestic Customer	$2.79	$2.76	+ 1.1

BASIC INFORMATION AS OF DECEMBER 31st

Generating Capacity (kw)—Steam	23,708,900	24,042,200	
—Water Power	9,021,700	8,999,200	
—Internal Combustion	468,500	453,000	
Total Generating Capacity in Kilowatts	33,199,100	33,494,400	
Number of Customers			
Farms in Eastern Area (Included with Domestic)	(534,203)	(507,522)	
Farms in Western Area (Included with Commercial—Large)	(209,751)	(206,036)	
Domestic Service	20,484,232	20,004,098	
Commercial—Small Light and Power	3,727,478	3,697,324	
Commercial—Large Light and Power	526,853	527,656	
All Other Ultimate Consumers	69,974	66,437	
Total Ultimate Consumers	24,808,537	24,295,515	

* By courtesy of the U. S. Geological Survey with deductions for certain plants not considered Electric Light and Power Enterprises.

Note: January and February Monthly Data will be reported in April issue.

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EDISON ELECTRIC INSTITUTE BULLETIN

Volume III MARCH, 1935 No. 3

Experience With Electric Rate Reduction

By C. W. Kellogg

Chairman, Engineers Public Service Company

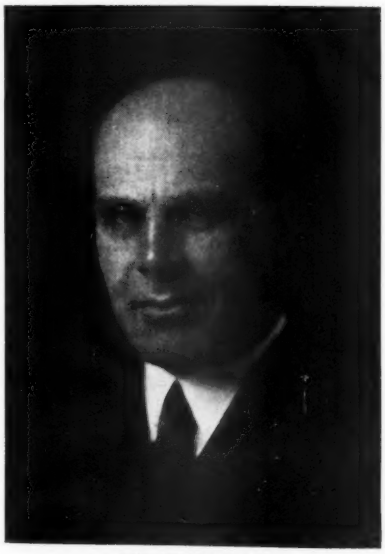
An address delivered before the Eastern Savings Division of the American Bankers Association, March 7, 1935

IT is axiomatic that the growth of any business will be most vigorous and most sound if it is developed in tune with the fundamentals of the business in question.

The outstanding characteristic of the electric service business, which distinguishes it from the usual industrial undertaking, is not its monopoly feature, but the large proportionate size of its fixed investment. The monopoly feature is incidental and I will touch on it later; the investment character is inherent and fundamental and it is independent of who makes the investment.

Based on U. S. Census figures, the investment in the average industrial enterprise in the United States is about $0.71 per dollar of annual gross business. With the electric companies this figure is $5 to $7 per dollar of gross business. The charges for depreciation and for a return on this investment, sufficient to attract capital to it, are about one-half the entire cost of doing business. Taxes in the last year have reached staggering proportions. In the case of Consolidated Gas of New York taxes in 1935 will be about 22 per cent of the gross earnings and for the electrical industry as a whole about 15 per cent of the gross. Thus about two-thirds of the total costs of electric companies are fixed independently of the exact amount of energy sold. The remaining one-third of the costs are operating expenses and maintenance and two-thirds of the, consisting mostly of payroll, go on somewhat independently of variations in the amount of energy sold. It is evident, therefore, that by far the larger part of the cost of electric service is fixed or semi-fixed.

There are two conclusions which follow logically from the fundamental nature of the electric business which has just been stated: (1) that after the rates for the average amount of service for a given customer have in a measure cared for fixed charges, the rate for additional use can be drastically reduced and still show a profit; and (2) that any proposed "yardstick" for electric rates must be carefully scrutinized to see how fully it cares for the basic fixed charges involved in electric service. For example, the Tennessee Valley Authority has announced that only 50 per cent of the cost of the Norris Dam will be charged against power production, and the same ratio has been proposed for the Bonneville Dam on the Columbia River. This would make a yardstick, based on *such* an allocation of investment, only 27 inches long so far as it might be used to measure the results obtained by any private company having to carry the *whole* investment. The exemption from taxes enjoyed by government undertakings would further cut the length of such a yardstick down to 21.6 inches and the use of the postal franking privilege, reduced freight rates and the like could easily shrink the yardstick to about half the standard length. Such a yardstick resembles more the bed of Procrustes than an accurate measuring instrument.



MR. KELLOGG

To present adequately the matter of the rate reductions made possible by increased use of electricity requires further breakdown of the general statements previously made.

First, as to the make-up of the electric business. Electric earnings are obtained in approximately equal parts from residential customers, commercial customers (stores, hotels and small power users) and wholesale power customers. The last category is largely a competitive business where the cost to the customer must be less than it would cost him to furnish his own power. This form of economic competition exists also with the larger commercial customers and but slightly with the smaller commercial customers. With the residence customers electricity for lighting is nowadays non-competitive, but for other uses, like refrigeration, cooking and water heating, competition is encountered with the ice company, the gas company and the coal company. Reduced rates for larger consumption make it possible to meet this competition so far as *operating cost* to the consumer is concerned, except where the availability of natural gas makes for low gas rates.

I have emphasized *operating cost* to the customer because I want to bring out a point not generally realized by the public, namely, the magnitude of the

investment which the customer himself has either to make or to carry in utilizing electric service. Of the 20,500,000 residential electric customers in this country, the average annual consumption of electricity is about 630 kilowatt hours, representing an average diverse demand on the central power station of ¼ kilowatt per residence—i.e., an investment by the electric company to serve him of about $150, largely represented by distribution system investment. It has been conservatively estimated that the average residence has an investment in electric equipment of $330, or over twice as much as the entire investment of the electric company to serve him. In the desire of the electric company to sell more energy and the corresponding desire of the home-owner to obtain the comfort and convenience which he can get from using electric service more extensively, the cost of the electrical equipment required to make this use is a greater stumbling block than the rates for electricity, provided these have been designed with intelligent regard to the rate necessary to make the additional service appear economically attractive to the customer. For example, the electric cooking business will not thrive on a rate much above 2½c per kwhr and water heating requires an even lower rate to make a general economic appeal.

After the first few well-to-do families in any given community have purchased the larger household electrical equipment, strong sales resistance is encountered from the great number of householders who would gladly make greater use of electricity in their homes, but cannot afford to buy the equipment required to do so. This leads naturally to installment sales and the latter in turn tend to provide longer and longer periods of payment. The ultimate in this direction has been attained by certain electric companies who offer to rent the larger household apparatus. From the same cause has come continued pressure on the manufacturers (in which the TVA has been most effective) to reduce the prices for household electrical equipment.

Having thus briefly stated the basis and nature of the problem, it is desirable to be more specific as to the details of the design of inducement rates. Again using average figures, experience shows that lighting and small appliances alone represent a consumption per home of 25 kilowatt hours per month—about 300 kilowatt hours a year—and even as recently as 1925 the average residential consumption of the nation was only 398 kwhr annually. Electrical refrigeration on the average adds about 50 kwhr to the monthly consumption, electric cooking about 125 kwhr more and water heating 250 kwhr to that, making an average total from this "full use" of 450 kwhr per month, or 5400 kwhr per year—a total 18 times as large as that resulting from lighting and small appliances alone. From the basic principles I have cited it is clear that there is no reason why this larger consumption should cost the customer 18 times as much as the smaller, because it does not cost the company that much more.

Rates which represent these considerations have been in use by all progressive electric companies for a number of years with satisfaction alike to the companies and to their customers. From 1925 to 1934 the average annual residence consumption has grown 54 per cent (from 398 to 631) and the average residence rate per kwhr has decreased over 27 per cent (from 7.3c to 5.3c). The end of this process in the United States is not yet in sight. The larger companies in the group I represent show average residence consumption considerably above the national average; and one small property, where no gas is available, has a residential average of 1350 kwhr per annum. In Winnipeg, Canada, an annual average of 4000 kwhr per residential customer has been attained. All of these figures are averages which are pulled down by the preponderance of very small customers; individual houses using 8000 to 9000 kwhr per year are not uncommon.

Rates now in effect in one of our properties on the eastern seaboard serving a medium-sized Southern city and surrounding territory are:

Schedule effective throughout entire area serve, Jan. 1, 1935

First	25 kwhr. per month	@ 6½c
Next	35 kwhr. per month	@ 5c
Next	140 kwhr. per month	@ 3c
Excess	kwhr. per month	@ 1½c

Minimum Bill $1.00

By comparing these with the zones of average consumption I have mentioned, it will be seen that electricity for lighting costs 6½c per kwhr, for refrigeration an average of 4½c and for cooking 3c, with all excess at 1½c. At these rates there is a distanct *inducement* to the customer to utilize electricity for the purposes in question. Hence the term, "Inducement Rates."

Up to this point I have been dealing largely with arithmetic, which makes the problem sound fairly simple. In actual practice, however, the matter is not quite so simple. In the first place, you will note that for the average residential consumption of about 600 kwhr per year the inducement rates show very little saving. In the second place, the situation is aggravated by the fact that the vast majority of homes do not use even the average consumption. Country-wide, the general statement may be made that two-thirds in number of the customers furnish but one-third of the residence revenue or about one-ninth of the total revenue. This overwhelming numerical majority of customers are, per kwhr, the most expensive to serve. The fixed expenses I mentioned are nearly as large for each of them as for their larger-consumption neighbors; so that, if these expenses were arithmetically divided among them on a kilowatt-hour basis, the resulting rate, though perhaps accurate, would be so high as to cause great discontent—and two-thirds of an electric company's customers discontented means two-thirds of the voters discontented. In a word, our old friend "politics" comes inevitably into this picture.

This political question, like any other political question in a free country, has to be compromised in some reasonable way. The reason it has to be compromised is that if the effort should be confined to getting the lowest possible *average* rate, even this could not be brought low enough to make electric cooking and water heating economically attractive to the householder, with the result that these uses would not generally be made and hence the very thing aimed for (lower rates through greater consumption) would fail. This is merely another way of saying that the cost of serving the small customer has to be carried in part by the larger customer, who, due to his better consumption, should really be entitled to the entire saving which his production effects. In the state-owned and operated Ontario Hydro Power System in Canada, political considerations have been given full sway by reducing residential rates for the little fellow at the expense of the commercial and large users, resulting in a restriction of use by the latter, which, when taxes are allowed for, produces higher over-all average rates than in corresponding territory in New York State.

There are very few so-called "top rates" (meaning thereby the rate per kwhr for the first block consumed) in this country lower than 5c per kwhr and where the top rate *is* lower than this, the size of the blocks of energy at lower rates is such as to produce about the same average result. At a 5-cent rate

for the top step or block, the two-thirds majority I mentioned pay for about 60 per cent of the cost of serving them, which I think you will agree is all the subsidy the little fellow could reasonably expect from the large user—especially when such "larger user" is not necessarily a wealthy person but merely one who makes a large use of electricity.

In addition to the inducement rate I have described, and having an eye both to the political skies and to the commercial effect, some companies have been lately announcing so-called "objective rates," which are merely a schedule providing for specific cuts as and when certain designated figures as to average residential consumption shall be attained by the community. Such objective rates tend to show the public that the company is sincere in its purpose to reduce rates as rapidly as conditions warrant and should tend to quiet rate agitation during the development period.

This leads to my final point as follows: It is easy for uninformed enthusiasts, viewing the success which electric companies have had in making up for rate reductions by increased consumption of electricity, to jump to the conclusion that rate reductions in and of themselves produce more revenue, with the equally ill-considered corrollary that the more the reduction the greater the earnings. A moment's thought will show the absurdity of this reasoning, the logical result of which would be that the greatest earnings would come from no rates at all.

Perhaps the clearest analogy can be found by considering the effect of exercise on the human body. The immediate effect is to tear down cells and thus reduce bodily strength; the beneficent effect comes from the heart rebuilding the lost tissues and perhaps building back more than the original amount, all due to the stimulus of the destruction produced by the bodily exercise. The right amount of exercise is that from which the body can build back without injury; too little means fatty degeneration, too much means exhaustion—in extreme cases death.

The same principles apply to rate reduction: too little means atrophy and a discontented public; too much at one time could easily seriously injure a company's credit, with bad effects on the quality of service, or, in extreme cases, bankruptcy. The proper amount of reduction is that from which the company making it can recover within a reasonable period and with the application of intensive sales activity. With the speed of heart action, the human body recoups from the wear of exercise at the most in a few hours. An entire community, due to its much greater size and the time it takes to sell people an idea and for them to act on it, reacts much more slowly. It often takes from one to one and a half years to build back from a substantial rate reduction.

Metaphors and analogies are dangerous things, since they seldom fit all points of the case. In the matter of rate reductions each successive cut makes subsequent ones more risky and difficult; for if they do go to the extent of really hurting a company financially, the public will lose in the end from poor service. While, as stated earlier, the end of rate reductions is not yet in sight, on the other hand the public should realize that there is no white rabbit magic about it—it is intensely practical—and every situation that arises should be fairly considered on its merits. The rapid growth of taxation recently has had a deterrent effect and drastic inflation could easily cause rates to go up instead of down.

In present-day discussions the subjects of rates and water power are so interwoven in the public mind that any general discussion of one would be incomplete without at least a brief statement about the other. Under the stimulus of the New Deal the whole country has gone wild on the subject of water power, or, with the more common use of the Greek word that means the same thing, hydro. Here are the facts: using averages, the ordinary electric company from all its business takes in, gross, about 2c a kwhr. With its plant built, its business developed and its employees or its payroll, the out-of-pocket cost for the fuel to make a kilowatt hour in a steam plant is about 3 mills. The corresponding out-of-pocket cost with a hydro plant is of course zero; but on the average the greater unit investment cost of hydro plants and their transmission lines makes fixed charges higher by about the same 3 mills, so that on the average there is practically nothing to choose between the two. If, departing from the average, we compare a small steam plant with expensive fuel with a nearby and economically sound hydro plant, the advantage is, of course, with the hydro; but, by a corresponding departure on the other side, a modern steam station, with ample condensing water and average fuel price, is a cheaper service of supply than a distant and uneconomical hydro plant. Here again each must be considered on the merits of the individual case.

With some notable exceptions, hydros suffer from one or both of the following handicaps as compared with a good steam plant located at the load center: either the necessity for a relatively large investment in steam plant capacity to make up for the seasonal and annual variations in stream flow, or the menace of major service interruptions due to the effect of sleet, tornadoes or lightning on transmission lines. On both of these matters I can speak feelingly after many years' experience with them.

In a word, speaking of average conditions, hydro power is not necessary for low rates and will not produce as reliable service.

Summarizing, I have tried to show that, due to the large proportion of the total costs of furnishing electricity that is relatively fixed, rates for residential electricity can be progressively reduced and earnings still maintained, provided: the reduced rate structure is so designed as to encourage and realize greater use of electricity and that the amount of reduction at any one time is not so great as seriously to weaken the company. I have stated further that, following these principles, residential rate reductions can go substantially further than they have yet (barring excessive taxes and inflation) and that at present, on the average, water power can have little if any effect on the costs of residence service. Hydro power may in fact come to have a substantial effect on residence rates (as contrasted with costs), but the effect will be political in origin, even though economic in result.

Third Annual Convention

EDISON ELECTRIC INSTITUTE

Mayflower Hotel, Washington, D. C., June 3-6, 1935

Information on the Convention in April Bulletin

TVA's Budget

A Glimpse of the Dollars and Cents Side of the Tennessee Valley "Experiment"

Reprinted from a pamphlet of the National Coal Association, by permission

THE dollars and cents side—from the taxpayers' standpoint—of the TVA "experiment" is of manifest importance. Some insight into the complicated financial affairs of the Tennessee Valley Authority may now be obtained from an examination of TVA's budget summary and supporting schedules which occupy a dozen pages in the 871-page document known as the "Budget for Fiscal Year of 1936," and which was sent to Congress at the beginning of the present session.

In creating the TVA two years ago Congress provided it with 50 million dollars in cash and the permission to issue on its own account, but with government guaranty, 50 million dollars in bonds in the event it needed additional funds for further water power development. These limits—50 million cash and 50 million bonds—were then supposed to represent the maximum cost of the TVA experiment. Thus launched in the power and fertilizer business, the TVA was publicized as a self-supporting and ultimately self-liquidating venture.

TVA has not resorted to its bond issue and has indicated it has no present intention of doing so. The bonds are to be held in reserve—a final recourse if the day ever comes when Congress locks the doors of the Treasury.

No specific appropriation by Congress for the TVA was necessary last year because Congress generously designated the TVA as one of the agencies permitted to share in the emergency public works fund, and the President generously allotted to TVA 25 million dollars.

This 25 million was only half the amount for which TVA asked last year. But with the 50 million dollars given TVA by the original Act of Congress, it makes a total of 75 million dollars in cash from the U. S. Treasury which TVA has had to date.

TVA Reports:

Its total actual expenditures for the 12 months ending June 30, 1934.....$13,227,763

Its estimated expenditures for the 12 months ending June 30, 1935..... 70,571,336

Its estimated expenditures for the 12 months ending June 30, 1936..... 63,379,954

Three-year total is $147 million.

TVA does not claim that this entire sum will all have been actually spent by June 30 of next year, but it will all have been "obligated." On a strictly cash basis, TVA reports its disbursements, past, present and prospective, as 11 millions last year; 38 millions this year, and 46 millions next year.

TVA Now Seeks An Appropriation from Congress for the Coming Fiscal Year of $56,785,152

(Note: Besides the $75,000,000 TVA has already had and in addition to this new appropriation of $56,785,152, the budget summary reveals that TVA is counting on an "allotment" this year of $5,300,000 from "other emergency moneys.")

The foregoing figures do not measure the total prospective cost of the TVA. The TVA has neither cost limit nor time limit.

TVA Chairman Morgan, testifying last year before the congressional committees, "guessed" that 300 million dollars might cover the total cost of TVA's "immediate" dam building and power distribution program. The fertilizer program and regional development program would be extra.

Dr. Morgan's estimates of subsequent TVA appropriations were:

41 million dollars for 1937
45 million dollars for 1938
40 million dollars for 1939

TVA's Own Allocation of Its Expenditures

Water Control Program—		
1934.....	$5,858,923	
1935.....	41,266,325	
1936.....	32,718,948	
		$79,844,196
Electricity Program—		
1934.....	$1,772,830	
1935.....	17,260,260	
1936.....	16,106,006	
		35,139,096
Fertilizer Program—		
1934.....	$553,142	
1935.....	3,099,424	
1936.....	4,010,000	
		7,662,566
Regional Development—		
1934.....	$2,299,789	
1935.....	4,976,002	
1936.....	5,905,000	
		13,180,791
Administrative—		
1934.....	$1,137,301	
1935.....	1,900,583	
1936.....	2,040,000	
		5,077,884
Service Activities—		
1934.....	$1,605,778	
1935.....	2,068,742	
1936.....	2,600,000	
		6,274,520
Total.....		$147,179,053

TVA's Budget Figures Reveal Its Magic Formula For "Cheap" Electricity

TVA assigns 24 per cent of its total expenditures (35 million dollars out of 147 million dollars) to its "Electricity Program" and all the rest to other functions.

The construction costs of its dams it assigns to "Water Control Program" to be later distributed to navigation, flood control, national defense and power.

Muscle Shoals expenses of "general operations" is grouped under "Service Activities." The cost of the town of Norris is assigned to "Regional Development."

TVA's budget schedules contain no items of interest and no items of taxes, but "depreciation" has already made its appearance. Deductions of "depreciation" help shrink the capital cost on TVA's balance sheet.

Norris dam and power house, as yet only half finished, takes a depreciation deduction of $100,000 last year, $1,000,000 this year, and $791,688 next year.

Wheeler dam takes one million dollars of "depreciation" before it gets into operation.

The construction cost of the town of Norris is shown to have been $1,745,421 up to June 30 last year, plus $1,471,509 this year, total $3,217,030. For the development of "community settlements in the Norris area" TVA budgets itself with $500,000 this year and $2,000,000 next year.

"Maintenance and operation" of town of Norris this year is figured at $173,-983 and for next year $200,000 (with nothing for interest, taxes or depreciation) and all charged to "Regional Development." "Rentals, etc.," from the town of Norris are figured at $108,613 this year and $150,000 next year. When it comes to "electric revenues" the town of Norris again bobs up and TVA estimates $20,000 from the town this year and $30,000 next year to help swell its electricity income.

TVA's Gross Revenues Were:

1934 (actual)	**$ 862,588**
1935 (estimated)	**$3,021,313**
1936 (estimated)	**$6,210,000**

These figures are the totals which TVA puts into its budget summary. They are not "profits." They are not even "net income." They are the "gross receipts" from all sorts of sources, including receipts from TVA's own subsidiaries and interdepartmental switching of accounts.

Not all these "revenues" are related to TVA's "electrical operations." They include a figure of $570,000 as estimated revenue from "fertilizer operations" this year: $1,340,000 from this source next year.

TVA's total revenues from its electrical operations last year were $812,-574, and of this amount $791,182 was received from the Alabama Power Company in payment for TVA electric power purchased by the Alabama company.

TVA's estimated revenues from electrical operations this year are $2,208,-000, of which $1,000,000 is assigned as the prospective revenue from the present privately owned electric light and power properties at Knoxville, which TVA has been trying to purchase from Tennessee Public Service Co.

TVA has estimated its total revenues from electrical operations next year at $4,600,000, and of this amount $2,000,-000 is counted on from Knoxville. The Knoxville purchase has not yet been consummated. It is tied up in litigation. It may never be consummated, and, if ever, it looks to be a long time ahead.

No wonder TVA was in haste to acquire Knoxville and indignant when the sale was blocked. For it was relying on Knoxville to provide nearly 50 per cent of its electric power revenues this year and next year.

TVA's Splurge For Research

For coal research $100,000 is budgeted this year and $125,000 next year, and for ceramic research $125,000 this year and $175,000 next year. Both of these items are in the "Regional Development Program" schedule. TVA sets up another $100,000 next year for "coal research and semi works plants" in its "Fertilizer Program" schedule.

For "surveys and promotion of industries" it lists $181,784 this year and $180,000 next year, charged up to "Regional Development Program," as well as $700,000 next year for "research" of unspecified character, and $87,628 for "social studies research" this year and $100,000 next year, and for "research" in agricultural development $110,680 this year and $150,000 next year, and for "demonstrations" $165,273 this year and $500,000 next year.

These large items are all additional to separate and individual budgetary items for "archeological survey," "wild-life studies" and "basic studies in public health" and "tree crops experiments" and "industries and power market studies." Expenditures of more than a quarter of a million dollars are classified as "employee training." For "sales promotion" TVA budgets $100,000.

In TVA's schedule of its "Electricity Program" and under heading, "construction and acquisition," the principal items in 1936 column are "miscellaneous high tension lines & substations, $4,250,000; industrial lines & extensions, $1,864,-700; purchase of more transmission systems, $5,017,000."

TVA allows itself $2,262,983 this year for "tributary dam or dams" not specified, and $6,000,000 for this purpose next year; and for "engineering and preliminary design" on "main river dam," $150,000 this year and $1,500,-000 next year. These are items in its schedule of "Water Control Program" and are additional to estimates for Norris, Wheeler and Pickwick dams.

Judges Appointed for Prize Contests

MR. FRANK W. SMITH, chairman of the prize awards committee of the Edison Electric Institute, has announced the appointment of the judges of the entries for the several prize awards administered by the Institute for 1935.

The closing date for papers entered for the Byllesby, Forbes, Lindemann and McGraw prizes was March 1st, while the closing date for the remaining contests is April 1st. The papers submitted for the former prizes will shortly be reviewed by the judges. Announcements of the winners will be made at the convention in June.

The judges are:

H. M. BYLLESBY PRIZES

Dean JOHN T. MADDEN, *Chairman,* New York University, Washington Square East, New York City.

B. F. BRAHENEY, Vice-President, Byllesby Engineering & Management Corp., 231 South LaSalle St., Chicago, Ill.

WILLIAM PAXTON LITTLE, Niagara Hudson Power Corporation, 15 Broad Street, New York City.

B. C. FORBES PRIZE

P. L. THOMSON, *Chairman,* Director of Public Relations, Western Electric Company, 195 Broadway, New York City.

BRUCE BARTON, President, Batten, Barton, Durstine & Osborne, Inc., 383 Madison Avenue, New York City.

Judge C. W. APPLETON, Vice-President, General Electric Company, 570 Lexington Avenue, New York City.

A. L. LINDEMANN PRIZES

EARL WHITEHORNE, *Chairman,* Assistant Vice-President, McGraw-Hill Publishing Company, 330 West 42nd Street, New York City.

KATHERINE FISHER, Director, Good Housekeeping Institute, Eighth Avenue and 57th Street, New York City.

W. F. HENZE, President, *Electric Kitchen Times,* 608 Caxton Building, Cleveland, Ohio.

JAMES H. McGRAW PRIZES

R. H. TAPSCOTT, *Chairman,* Vice-President, The New York Edison Company, 4 Irving Place, New York City.

LOUIS ELLIOTT, Consulting Mechanical Engineer, Electric Bond & Share Company, 2 Rector Street, New York City.

L. W. W. MORROW, Editor, *Electrical World,* 380 West 42nd Street, New York City.

CHARLES A. COFFIN AWARD

THOMAS N. MCCARTER, *Chairman,* President, Edison Electric Institute; President, Public Service Corporation of New Jersey, 80 Park Place, Newark, N. J.

KARL TAYLOR COMPTON, President, Massachusetts Institute of Technology, Cambridge, Mass.

FRANK W. SMITH, Chairman, Prize Awards Committee — Edison Electric Institute; President, The New York Edison Company, 4 Irving Place, New York City.

GEORGE A. HUGHES AWARD

MARVIN KNIGHT, *Chairman,* Vice-President, J. Walter Thompson Company, 420 Lexington Avenue, New York City.

ELL C. BENNETT, President, Bennett-Watts-Haywood Company, 1836 Euclid Avenue, Cleveland, Ohio.

W. E. UNDERWOOD, Lord & Thomas, 247 Park Avenue, New York City.

THOMAS W. MARTIN AWARD

J. S. TRITLE, *Chairman,* Vice-President, Westinghouse Electric & Mfg. Company, East Pittsburgh, Pa.

PHILIP S. ROSE, Editor, *Country Gentleman,* c/o Curtis Publishing Company, Philadelphia, Pa.

DR. E. A. WHITE, Director, Committee on Relation of Electricity to Agriculture, 58 East Washington Street, Chicago, Ill.

Recent Statistics of Interstate Power

Power Crossing State Lines Accounts for Only One-Quarter of One Per Cent of Gross Revenue

THE following table shows the amount of interstate transfers of electric current during the past several years and the ratio which this amount bears to the total power generated by the electric light and power industry in the United States:

	Kilowatthours Generated	Interstate Movement	Per Cent
1928	80,453,498,000	9,314,288,000	11.7
1929	90,084,428,000	11,134,284,000	12.5
1930	88,591,736,000	11,901,681,000	13.5
1931	85,575,307,000	12,488,401,000	14.6
1932	76,885,248,000	12,595,460,000	16.4
1933	79,259,087,000	14,146,000,000	17.8
1934	84,532,153,000	14,800,000,000	17.5

It will be observed from this table that the amount of interstate power has been increasing throughout the period and that with the exception of the last year the ratio also has been increasing; that is, the amount of interstate power has increased faster than total generation. The growth of the percentage of interstate power reflects in part the completion and effectuation of interconnection programs, but to a still greater extent it results from the building and placing in operation of a few very large generating plants located across state boundaries from their markets.

Two-thirds of the entire interstate business in electric power comes from a very few plants, twenty-five water power and eight steam plants. Notable among these are the State Line steam plant of East Chicago, supplying the Chicago market but located just over the line in Indiana; the Conowingo, Maryland, hydroelectric plant, supplying the city of Philadelphia; and the Cahokia steam plant, supplying St. Louis, Missouri, from the Illinois side of the Mississippi. Two of these generating plants, the Conowingo and State Line generating stations, which came into full operation during the period covered by these statistics, contribute almost 20 per cent or one-fifth of all interstate power and have been largely responsible for the increases shown in the table.

A glance at the map of the United States shows how many of the large cities of this country are located on waters which form state boundaries. Consequently, although the supply of power is inherently a local matter, in the search for the best location for power generating sites, a number of stations have been located across state lines.

The bulk of interstate power flows in one direction and is carried over a comparatively few interstate lines. Power traded back and forth amounts in kilowatthours to about one-sixth of the total interstate transfer of power.

Practically all interstate sales of power are at wholesale rates. Retail transactions amount to a negligible fraction of 1 per cent.

Interstate power transfers taking place between divisions of the same company operating in two or more states account for about half of the total. Almost an equal amount takes place between affiliated companies, and only 6 per cent of the total interstate power business is between non-affiliated companies.

Expressed in terms of total power generated in the United States, 82½ per cent of the total supply is intrastate, 16½ per cent is transmitted over state boundaries but the transaction remains within the same company or is between affiliated companies, and only 1 per cent of the total is transferred between non-affiliated companies across state lines.

The total amount paid for this interstate power between non-affiliated companies amounts to less than $5,000,000 per year, or about one-quarter of 1 per cent of the gross revenue for the entire electric light and power industry.

State or other local regulatory authorities, according to legal opinion based upon decisions of the Supreme Court, have jurisdiction over interstate power transactions within the same company or between affiliated companies. Only those interstate power sales between non-affiliated companies are exclusively within Federal jurisdiction so far as concerns the direct regulation of the wholesale rate. Of course, the rates which may be charged the ultimate consumers, in all cases, are subject to control by state or other local authority. Lack of power to control this wholesale rate for interstate power transfers between non-affiliated companies constitutes the so-called gap in local regulation. The width of this gap is indicated by the fact that the amount of money involved is about one-quarter of 1 per cent of the gross revenue of the industry.

Missouri Valley Engineering Group Meeting

The seventh annual meeting of the engineering group, Missouri Valley Electric Association, was held at Kansas City on Feb. 18 and 19, with two hundred and forty men registering to participate. Of this number, one hundred and seventy men were representatives of central station companies. Twenty-nine electric companies and two telephone companies in the five states, Iowa, Kansas, Missouri, Nebraska, and Oklahoma, took part.

Two full days were devoted to group meetings with percentage of attendance remarkably high.

Meeting at the same time and place was the general power group, which has been engaged in perfecting an organization cooperating with the sales group and engineering group, but not a part of either. About thirty men attended this two-day meeting.—T. B.

Private vs. Government Ownership and Operation of Public Utilities

By John E. Zimmermann

President, The United Gas Improvement Company

Abstract of Address before Wharton School, University of Pennsylvania, on January 10

ALTHOUGH the sponsors and promoters of the Federal program are not prepared at present to admit it, the logical issue presented to the people of the United States as represented by the TVA and other government yardsticks is: Shall these great utility services continue to remain in the hands of private investors, or shall they gradually pass into the control and management of Government—Federal, State and local?

The job which the electric industry, without realizing it, undertook when the Pearl Street Station was put into operation in 1882 was not merely to supplant gas lights with electricity. It was nothing less than to electrify American industry; to quicken the wheels of progress of the nation; to transfer the burden of labor from the backs of men and women to the electric motor; to increase the productive capacity of the American laborer and thereby make it possible for him to share to a greater and greater extent in the product of his labor.

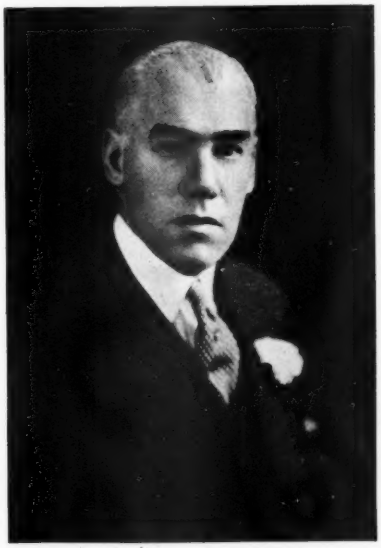
The development and accomplishments of the electric industry demonstrate convincingly, to my mind, that it has at least measurably fulfilled its mission.

In the years that followed there ensued a fierce struggle among rival interests over franchises. As a result, for many years, indeed until the early part of this century, the industry went through a period of intense and destructive competition.

Competition Not in Public Interest

Gradually the public authorities, the investing public and the consumers came to a realization that competition in electric service was not in their interest. Corruption in the awarding of utility franchises resulting from the scramble of conflicting interests and the wretched service resulting from competitive conditions, proved by bitter experience that competition between utilities was wasteful and uneconomic.

Therefore, judged by past experience, the present Federal policy of competing



MR. ZIMMERMANN

with the light and power business cannot be considered in the nature of an experiment, since the declared present policy of nearly all the states in the Union that the electric industry should be a regulated monopoly grew out of the disastrous experience gained from uncontrolled competition in the first 25 years of its history.

This principle was laid down nearly 20 years ago by the Public Service Commission of Pennsylvania in the case of the Phoenix Water Power Company, as follows:

> "The competitive theory in the operation of public utility enterprises has long since been exploded. It is obvious that the duplication of plant and cost of operation is an economic waste in most cases, because the consumptive power of a community has limitations as to quantity."

For a proper appraisal of the wisdom of this and similar declarations a short review of the history and achievements of the electric industry during the last 52 years will be helpful.

From an initial investment of less than one million dollars, that industry has expanded into one of the greatest in the United States, with an investment of about 12 billion dollars. Between 1920 and 1930, its average capital expenditures were between 600 and 700 million dollars annually. In 1930 at the request of the President of the United States and as an evidence of cooperation with the Government, the electric industry spent nearly one billion dollars in enlargement of its plants and facilities.

The installed generating capacity of the Pearl Street Station was approximately 720 horsepower, while for the entire nation the figure stands today at more than 44½ million horsepower. Service has been so extended that now 208,000 circuit miles of high tension transmission lines, 250,000 miles of urban and 100,000 miles of rural distribution lines are in use. The industry's customers number more than 24 millions and use in excess of 70 billion kilowatt hours annually.

Instead of charging all that the traffic will bear, as is claimed by some of the critics of the industry, its far-sighted leaders have for many years recognized that success lay in a policy of a large volume of sales at a small profit per unit rather than less volume at a greater profit per unit.

The effect of this policy is illustrated by the fact that in 1914, the average domestic use of electricity was 268 kwhr per year, while in 1934, such use had risen to 623 kwhr or an increase of 132 per cent. On the other hand, during the last 10 years the average domestic rate has declined from 7.30c to 5.34c per kwhr, or 27 per cent, despite the fact that in 1933 taxes took a toll of 12.72 cents out of every dollar of sales and today have increased to the point where they are considerably in excess of that figure.

Consolidations and Mergers

The financial losses and the poor service resulting from disastrous and destructive competition between contending interests in the electric field not only resulted in the establishment of Public Service Commissions, but also brought about the merger and consolidation of

these properties as an additional remedy for such an uneconomic condition. Examples of the benefits to the public which have resulted from mergers and consolidations are not wanting—benefits that could not have been achieved in any other way.

Let me illustrate by an example taken from what now constitutes the Philadelphia Electric System. This is not exceptional. In the year 1923 a customer in Doylestown, who paid $3 for electricity, now pays for the same quantity $1.60, or 47 per cent less, and if his bill was $6 then, he now pays $2.80 or 53 per cent less.

These mergers and consolidations into large systems, so typical of American practice and which have resulted in such phenomenal growth, are in contrast to the conditions which existed until recently in Great Britain and which greatly retarded development there. British laws prohibited the distribution companies from merging. As a result in Greater London there were 50 separate systems for electrical supply from 70 generating stations; with 24 different distribution voltages and 10 different frequencies. Appliances in use on one side of a street served by one company were not necessarily usable on the other side of the same street served with electricity by another company.

The British "Grid" System

These conditions became so intolerable that there resulted the establishment of the so-called "grid" system, which resembles closely the American system of interconnection with the maximum utilization of the most efficient stations. The "grid" system is nothing more or less than a power pool, under the direction of the Central Electricity Board. This Board does not own a single generating station, nor does it have any supervision, either directly or indirectly, over local distribution or rates charged to consumers. You will note the fundamental difference from our TVA where the Federal government not only fixes the wholesale rates to be paid by a municipality for its supply of electricity, but also fixes the maximun rates for resale by the municipality to its inhabitants.

In the United States in order to stimulate the sale of electricity, the light and power companies have for many years been actively engaged in the sale of electric appliances directly, and have encouraged dealers, distributors, department stores, drug stores and others to push the sale of electric appliances.

Thirteen Billion Invested in Appliances

The chairman of the Federal Power Commission is authority for the statement that the customers of electric companies have invested about 13 billion dollars in electric appliances in their homes, and that therefore the customers have more money at stake than has the electric industry by reason of its investment in plants and facilities. Mature reflection will convince any one that this enormous outlay for appliances on the part of customers could not possibly have been made unless the price of electricity was about right, and constitutes, it seems to me, an effective answer to all the political propaganda that rates have been too high. I also submit that this figure of the chairman is the best possible answer to the charge that the utility companies have not sufficiently promoted the use of electric service.

In the face of this extraordinary development of the electric industry, what are we offered by the Government to take its place? We are offered the TVA "yardstick" plan, which, whether or not so intended, must logically and inevitably lead the country to the complete socialization of the light and power business. In other words, the plan leads to government ownership and operation.

Government in Business

The only time when the Government in business issue was squarely presented to the people of the United States in a national election was in 1908, when Mr. Bryan as the Democratic candidate for President, advocated government ownership of the railroads and was overwhelmingly defeated.

I find it difficult to believe that our people will be better off under government ownership and operation of utilities than under private ownership and operation. No matter where you may look you will find that actual experience with government in business has proved the contrary and has frequently been followed by regret.

The history of government ownership of canals, shipping and railroads in this country has demonstrated conclusively to my mind the impossibility of business enterprises being successfully conducted by a political organization such as the Government.

By the use of the taxpayers' money and by arbitrary methods of bookkeeping it may be that the Government will be able to show—until the day of reckoning arrives—that it has succeeded in saving less than half the price of a package of cigarettes in the average user's daily electric bill! In addition, the Government's accounting will very likely be without the proof or rigid requirements to which business is subjected.

Our neighbors in Canada, in the Province of Ontario and elsewhere, have had state ownership of business enterprises in one form or another for many years. The result is well described in an editorial which appeared in the Montreal *Daily Herald* of Dec. 19, 1934, from which I partially quote:

"State ownership of business enterprises is a Utopian fallacy that, like a will o' the wisp, leads into a bog of endless trouble. Its evils are writ large upon Canada now.

"Take the railways. State ownership began with the old Intercolonial, which looked like a boon to the Maritime Provinces, but which sapped those provinces of initiative for generations and did nothing to develop their resources, because there was no incentive to make it pay.

"Take the blighting influence of railway ownership and provincial backing of railway finance on the Prairie Provinces and on British Columbia, which provinces by these means piled up mountainous debts that the Dominion had to assume 'to save the credit of Canada.'

"Take the Dominion's railway and merchant marine ownership policies—classic examples of the blight and burden of 'politics in business.'

"Take the Hydro-Electric Commission in Ontario. Sitting right on the top of Niagara's power, it ought to be a marvelous success if there were any virtue in public ownership.

"Instead of that its members have been ignominiously kicked out and a newspaper man, dragged out of retirement to run it, has shocked even its staunchest friends by the revelation he has made of its deficiencies —and worse."

* * *

"So far in Quebec we have not as a people made any important departure from the principle that the function of a government is to govern, but not to compete with the people it governs in those activities by which the people make their living.

"Let us hold fast to that principle—we are suffering enough from the Dominion's public ownership follies without indulging in similar follies of our own.

"Once a government departs from that principle—once it shoulders the burdens and responsibilities of business—then debts accumulate, the sources of taxation begin to dry up, initiative is destroyed, palms on every hand are held out for greasing, and disaster looms near."

The Canadian National Railway is publicly owned and managed and the Canadian Pacific Railway privately owned. In the report of the Royal Commission to inquire into Railways and Transportation in Canada, issued in

September, 1932, there appears a statement of comparative earnings which shows that for the nine years ending with 1931 inclusive, the Canadian National Railway had a deficit of $182,442,533, whereas the Canadian Pacific, privately owned, had during the same period a surplus of $312,879,978. Furthermore, the Dominon Government has an investment in the Canadian National Railway of $2,536,665,000.

Coming nearer home, we have the experience of the Dakotas in state operation of many forms of enterprise. The failure of the experiment is a matter of record.

Municipal Operation Is No Better

Nor is municipal operation, except in some instances to which due credit must be given, any better; perhaps on the whole it is worse. For example, from 1887 to 1897, the city-owned Philadelphia Gas Works was managed directly by city officials. According to the report of the then Director of Public Works, the service from the technical standpoint was very bad and the works were in deplorable condition. Due to the political aspects of employment then, one employee served inefficiently 72 customers, whereas now one employee serves 164 customers, partly, of course, as a result of improvements in the art but also partly to non-political employment. In short, in the words of a special commission of council:

"If private enterprise were conducted in the same manner as the city has conducted its Gas Works, two-thirds of them would be languishing in receiver's hands."

Government ownership, among other things, would mean eventually, if not at once, the turning over of these great services to be managed by the organized political machines of our great cities.

William Green, president of the American Federation of Labor, said in 1927:

"The initiative of those who ventured in the field of industry has been rewarded by the success of their endeavors. They have been fortunate in that they have been permitted to carry on their business in a land which guaranteed them the right to own and possess property and to enjoy all the benefits which come from private undertaking and private enterprise. Both employers and employees have been free from the domination of autocratic control and governmental dictation such as prevails in some of the other lands. This condition creates a feeling of security and assurance and encourages private initiative and private enterprise. It inspires a feeling of independence and satisfaction among the millions of working people who make up a large part of our citizenship. They prize freedom, liberty and justice very highly."

Testifying before the House of Representatives Committee on Appropriations Feb. 14, 1928, Rear-Admiral Magruder declared:

"It costs anywhere from 25 to 50, and in some cases nearly 75 per cent more to build warships in Navy Yards than it does to build them under private contracts."

He said that one reason for the higher costs is the fact that in Government yards "it is difficult to discharge a man who may not be fully competent."

Therefore it is not difficult to understand the result of a recent canvass of the press of the country by the National Industrial Conference Board which showed that 71.8 per cent of the editors of the country were opposed to government ownership of power companies.

The Government's power program of hydro-electric development which affects Arizona, California, Nevada, Alabama, Georgia, Mississippi, Tennessee, Washington, Oregon, Montana, Wyoming, Nebraska and Texas, calls for a generator rating in horsepower of 2,175,000, at an estimated expenditure of $500,477,000, in round figures. Private capital invested in power plants in the states affected aggregates $2,897,300,000, with a generator rating of 9,820,000 hp., which on the basis of a 50 per cent load factor can produce 32,282,823,000 kwhr, or an excess capacity over sales in 1932 of 84 per cent. These Government plants will have an annual capacity based on a 50 per cent load factor of 7,143,202,000 kwhr, which when added to the unsold capacity of the private plants, will produce the astounding excess of power for which there is no market of 124 per cent.

Tennessee Valley Authority

The TVA is the latest and most dangerous threat to the theory upon which our government was established. While there is much discussion of soil erosion and reforestation and plans to enable the inhabitants of the Tennessee Valley to enjoy a fuller and more abundant life, the TVA in reality represents the entrance of the Federal Government on a gigantic scale into the light and power field in competition with existing companies. This competition lacks every element of fairness and violates the very principles of fair practice which the Government through the NRA is seeking to enforce in private business.

The Tennessee Valley Authority was created by enactment of Congress on May 18, 1933. It cannot be considered as purely a relief or emergency measure, since its aims are defined by its sponsor as an experiment in social planning and economy. The purposes of the act are stated in this language:

"To improve the navigability and to provide for the flood control of the Tennessee River; to provide for reforestation and the proper use of marginal lands in the Tennessee Valley; to provide for the agricultural and industrial development of said Valley; to provide for the national defense by the creation of a corporation for the operation of Government properties at and near Muscle Shoals in the State of Alabama, and for other purposes."

Section 4 of the Act authorizes the TVA "to produce, distribute, and sell electric power *as herein particularly specified.*" The specification as to the sale of power in Section 10, authorizes its board of directors "to sell the *surplus* power, not used, in its operations, and for operation of locks and other works, generated by it to states, counties, municipalities, etc."

Considering these sections of the Act, United States Federal Judge Grubb in the case of George Ashwander et al. vs. Tennessee Valley Authority, held as follows:

"The power to produce, distribute, and sell electric power or any other commodity, generally, is not in terms granted, and must be connected with a granted power, in order to exist. In this case, it is sought to be connected with the power to improve navigable rivers, the power to provide for the National defense or the power to make needful regulations concerning Government owned property. The Government has the right to create electric power to aid its operations, under any one or all of these granted powers. It also has the implied right to dispose of any surplus power not used for the named purposes, to prevent waste. It has no power to produce and sell electric power, except as incidental to a granted power, as in the case of the disposition of such surplus."

It is clear, therefore, that the intention of those who drafted the TVA Act was to avoid any question of constitutionality by limiting the power of the Government to the sale of *surplus* power only. In other words, the main purpose of the act, as declared by its terms, was to provide for the improvement of navigable rivers, the national defense, reforestation, and prevent soil erosion. The generation and sale of electric power is merely incidental to the main purposes of the Act.

Purpose of TVA Act Changed

It is quite evident that the TVA has changed the incidental power to generate and sell electricity into the principal purpose of the Act; and that navigation, flood control and reforestation are subordinated in importance to what the

TVA, regardless of the law, conceives to be its mission—namely, the establishment of a national power policy. The following quotations from statements of TVA will illustrate this conception:

"The Authority is an instrument of the people of the United States. It is charged with the duty of carrying out a national power policy."—*October 17, 1933.*

"The Tennessee Valley Authority Act marks the beginning of a new national power policy and national power program."—*November 11, 1933.*

"Is the Authority concerned only with power at Muscle Shoals? The Authority is concerned with the power development of the valley region as a whole. It is authorized to construct such dams in the area as it deems necessary, and to generate and distribute power from them."—*December, 1933.*

"We are making provision for one of the largest hydro-electric developments in the world, with a potential three million horse power available."—*April 22, 1934.*

To further illustrate this change in policy I also quote from the President's St. Lawrence Treaty message of Jan. 10, 1934, in which he said:

"As you know, I have advocated the development of four great power areas in the United States, each to serve as a yardstick and each to be controlled by government or governmental agencies. The Tennessee Valley plants and projects in the Southeast, the Boulder Dam on the Colorado River in the Southwest, the Columbia River projects in the Northwest are already under construction."

Constitutionality

Can we dismiss with a gesture the conclusions of the Hon. James M. Beck and Newton D. Baker that the Act is unconstitutional? I do not think so. These gentlemen and others, in opinions and decisions, have held that many of the current procedures of government in the TVA project are illegal. I refer you to the refusal of Judge Grubb, of the United States District Court for Northern Alabama, to dismiss a complaint brought against the TVA by preferred stockholders of the Alabama Power Company, who have raised serious constitutional questions regarding the activities of TVA. The court said:

"No power is conferred on it (the United States) to engage in any private business, unless incidental to some power specifically granted."

I refer you to the decision of Judge Cavanah, of the United States District Court of Idaho, in which the court held that PWA loans and grants for intrastate generating and distributing systems are invalid. I also refer you to the speech of Hon. John W. Davis on Dec. 22, under the auspices of the American Bar Association.

The determination of the constitutionality of the TVA and the legality of some of the things being done under the Act are of vital interest to those whose savings are invested in light and power companies. It is essential to our form of government that the public should be promptly advised by decision of the Supreme Court of the United States whether or not that which the Government is doing in the TVA is constitutional. If it is, it can only mean one thing—that private capital will seek safety from this paralyzing competition of the Federal Government by investment in other lines of business.

If the program for power as administered by the TVA is constitutional, it is then within the province of this or any subsequent Administration to establish similar yardsticks in every state, as indeed the President has recently said was his intention. Then, the Government can destroy the industry as we know it by the threat of competition, forcing the sale to it of properties at confiscatory prices, or by so impairing by actual competition the credit of the companies as to make their ultimate sale on any terms which the Government is willing to pay not only possible but probable.

When Dr. Arthur Morgan addressed you he seemed to question the wisdom of testing the legality of the Tennessee Valley Act by remarking: "The loss caused to the TVA and to the public by these obstructive actions will run into millions of dollars." My best reply to this is the following quotation taken from an address made by Donald R. Richberg on Nov. 17, under the auspices of the American Bar Association:

"It is not my claim that every legislative or administrative act which can be classified as part of the New Deal should be free from questioning as to either its wisdom or its legality, nor do I hold that it is unpatriotic for men to raise issues of the constitutionality of such acts. There is always the danger in a period of crisis that zealous men, to say nothing of foolish or vicious men, will attempt to ride roughshod over an opposition which may be earnestly devoted to the maintenance of principles and rights which must be upheld in order that individual liberty may be preserved."

Generation and Distribution of Electric Energy in the Tennessee Valley by the TVA

The Government's Tennessee Valley project is built around Muscle Shoals in Alabama as a nucleus. This generating unit, built during the war, consists of the Wilson Dam and the Sheffield Steam Station, with a combined cost of slightly less than $60,000,000. The Alabama Power Company, in whose service territory Muscle Shoals lies, made an offer for the power output, hydro and steam, of 4 per cent on the investment, or $2,400,000 per year. This was considered too low by the government authorities, and there was much talk from official sources of "stealing a great national asset."

When TVA took over Muscle Shoals the cost allocated to power purposes was $21,000,000, or a write-down of about 65 per cent. Remember that the Alabama Power Company's offer of $2,400,000 is thus nearly 12 per cent of what the TVA considers Muscle Shoals is worth for power purposes. You know that the Federal Government, through the Public Works Administration, has given and offers to give any municipality that wishes to compete with a private company, 30 per cent of the cost of building transmission and distribution systems on condition that rates are lowered.

In effect, this means that a consumer who is served by a municipal distributing system supported by this kind of a government grant and which purchases its wholesale power requirements from the TVA enjoys rates which do not represent the true cost of the service because the generating plant is appraised at one-third of its actual cost and the transmission and distribution system at 70 per cent of its true cost.

The Tennessee Electric Power Company, which is one of the private companies most directly affected by the competition of the TVA, could if it had the same advantages, eliminate practically all of its bonded indebtedness aggregating $46,400,000; or, looking at it in another way, the sum represented by the write-down made by the TVA in the value of its Muscle Shoals plants is nearly sufficient to pay for the Tennessee Electric Power Company's entire investment in generating plants.

The taxes of private utility companies usually run from about 10 per cent to 20 per cent of their gross revenues, whereas TVA is only required by law to pay 5 per cent on the wholesale price of its energy. And let it also be noted that municipally-owned distribution systems usually pay no taxes.

If the Tennessee Electric Power Company, the private company, had the same advantages or subsidies, then its taxes would be $200,000 instead of $2,000,000.

TVA has during the construction of its power facilities had the very unusual advantages of freight rates which do not exceed two-thirds of the freight rates

available to private shippers. The authority has also other advantages that will continue after the construction period is over, as, for instance, the privilege of franking all its mail matter, thus adding to our postal deficit. Its employees also travel on railroads at reduced fares.

In addition, the power delivered by the Government to distributors is subject only to a 5 per cent tax. The tremendous bearing that this has on the cost of power was recently stated by Dr. Warren M. Persons, consulting economist and former professor of economics at Harvard University, in an address before the Municipal Club of Brooklyn, when he said: "The TVA will pay in taxes 5 per cent of the wholesale price of 4 mills per kwhr of energy, as compared with 15 per cent or 20 per cent of the retail price paid in taxes by the private companies in the area. The single item of taxes paid by the private companies amounts to 4 mills per kwhr. Thus, private companies pay in taxes per kwhr an amount equal to the TVA wholesale price of energy."

Furthermore, the Government is able to finance its entire construction program on the credit of the United States at 3 per cent or 4 per cent, whereas public utilities conservatively financed can only obtain 50 per cent of their capital requirements on first mortgage bonds at low rates of interest. The balance of such requirements must be secured by the sale of preferred and common stock at 5 per cent, 6 per cent or 7 per cent. Capital represented by preferred or common stocks cannot be secured on any basis today because of the repeated attacks of the Government.

Can This Be a Yardstick?

In all fairness, may I ask how can electric enterprises conducted by the Government under such favorable and preferential conditions be held up as an example and a yardstick for rates to be charged by the public utilities of the country?

The small town of Tupelo, Miss., has become a much heralded and advertised symbol of what the Government can accomplish in the way of producing and distributing electricity. The distributing system in Tupelo was and is municipally owned. Before the TVA undertook to run the town's system with the advantage of those government subsidies to which I have referred, Tupelo represents to me a typical illustration of municipal inefficiency. I say this because of its then average domestic consumption of less than 400 kwhr per year as compared with 800 kwhr for towns served by private companies in its vicinity, and because its average rate to the domestic consumers was 20 per cent greater than the rate to consumers in comparable towns served by private companies.

When the TVA in February, 1934, undertook to supply energy to Tupelo it increased the consumption of electricity to 1000 kwhr per domestic consumer annually, or approximately 250 per cent of the previous rate, as a result of an intensive drive for new business during which it opened up show rooms for appliances without regard to expense.

While this is an admirable performance it has nevertheless been exceeded in an adjoining state where private companies took over four small similar towns with municipal operation and with rates comparable with those of Tupelo prior to its acquisition by the TVA. In these towns domestic consumption of electricity increased from 277 per cent to 414 per cent; all of it without any subsidy or assistance from the Government.

In the *Wall Street Journal* of Jan. 2, 1935, the statement is made that although the TVA has been functioning for more than a year, it still is only selling about 3 per cent of the power available at Muscle Shoals, and that the remaining 97 per cent is still being taken by the Alabama Power Company as in the past. Also, that in TVA's principal customer, the much publicized Tupelo, in spite of the sharp cut in rates, more than 50 per cent of the users there still take less than 50 kilowatt-hours a month, while 30 per cent of the 1400 residents are without electricity.

No Secrets in Generation and Transmission

I want to be sure that you understand one aspect of the Government's so-called program of cheap power that is generally overlooked. There are no secrets in the generation and transmission of electricity. Given a certain hydro-electric site, with a determined amount of water falling through a determined height, any engineer of experience can tell you how much electricity can be developed, as well as the type of dam that will be needed and the amount of cement and stone, and hours of labor required for its construction.

Unless and until our Government devises better means of producing and transmitting power than the private companies have been able to do under the existing state of the art, I submit to you as axiomatic that it can do nothing better or more efficiently than can private initiative and enterprise. If the Government can show lower costs than private enterprise, it will be because they are able with the credit of the taxpayers of the nation to hire capital at 3 per cent or 4 per cent, and because part of the cost of dams will be charged to other non-productive purposes such as flood control and soil erosion; because they may purchase their construction supplies and materials from contractors at prices that are 15 per cent under those fixed by Government codes for business, and because of special freight rates and other preferential advantages.

Let it be noted, it is by the efforts of our engineers and not by the efforts of the Government that the coal used to generate one kilowatt hour has been reduced from three pounds to less than one pound in a few years, and it is they who, in a large measure, are really responsible for cheaper electricity.

Can any fallacy, may I ask you, be more palpable than to claim that because the Government does not pay taxes, it can afford to sell electricity at lower rates than can private companies? True, those particular consumers who are served by the Government may save money, but only at the expense of the other taxpayers of the nation.

The President has said that one of the objectives of the TVA is to establish a yardstick by which other communities could judge whether or not they are being overcharged for electricity. I call your attention, however, to a fact which has not been publicly commented upon—that TVA rates are not set up so that they can be compared with the rates of privately owned utilities, because the former do not include all those elements of cost which the private companies have to meet and cannot escape.

That this is actually so is proved by a statement made by David Lilienthal on the witness stand when under cross-examination before the Railroad and Utilities Commission of Tennessee, during which he said:

> "It is not in contemplation that the Tennessee Valley Authority should charge or actually include in its accounts *items not actually expended,* but it should find out, for example, it should have an accounting basis which would *permit of a comparison,* adding to *actual costs any hypothetical costs which the person making the costs thinks is fair.* It is impossible to get an agreement on hypothetical costs, but it is possible at least to have a basis for measurement."

In view of this it seems hardly fair for the public to be told daily that rates

which do not approach those established by the TVA are unreasonable. Is it not also apparent that considerable time will have to elapse before the Government will have the facts of actual experience upon which to make this comparison? Is it not also true that before they are accepted as conclusive they should be subjected to careful public scrutiny? Again, therefore, is it not premature, before any of these things have been done or happened, for the Government to publicize that the rates established by the TVA are a "yardstick" by which rates should be judged all over the country?

How true all of this is and how long we will have to wait until we have some authentic figures of Government operation is further confirmed by Dr. Morgan's statement before the Sub-committee of the Committee on Appropriations of the Senate on June 13, when he said:

"Taken as a single unit the Muscle Shoals project is not profitable because there is not sufficient continuity of flow of the river resulting in a very great variation of power capacity and that is the object of completing additional dams up the river for storage purposes."

Again, when Senator Dickinson asked the question: "Now how can you fix the rate for your electrical energy at the present time when you do not know what the cost of your plant is going to be?" Dr. Morgan replied:

"We have fixed the cost of the energy we are selling now at what will be a reasonable income on those plants as we can best estimate them now, just as any private company would fix the cost under similar circumstances."

In his recent address to you, Dr. Morgan said, amongst other things:

"We believe that when the TVA was organized and its power policy was established, the prevailing rates for domestic power were about twice as high as were necessary to meet all proper charges on necessary and reasonable investment."

I am surprised that Dr. Morgan should make an arbitrary statement of this character without proof. If he has drawn this conclusion by comparing the TVA rates with those of private companies, then my answer is that this is not a fair comparison to make, because the Government enjoys numerous advantages not available to private industry, to which I have already alluded. In addition, it still remains to be proved whether the Government's operations are going to be profitable at the rates for electricity which it is advocating.

Lowered Rates Will Mean Great Losses in Revenue

Another impression which the Government has given the public is that if private companies would immediately greatly lower their rates, the increase in consumption which would follow would more than compensate them for the attending losses in revenue. The only difference between the Government and ourselves in this respect is the time element, or, in other words, how rapidly rates should be reduced. Private companies, faced as they are with the necessity of earning sufficient to cover their cost of operation, interest and a fair profit, cannot afford to impair their credit by the severe loss of earnings which would follow such drastic reductions as are advocated by the Government.

The TVA, which has arbitrarily fixed a rate of 3c per kwhr for the first block of energy, is not confronted with this problem since it has the resources of the United States Treasury behind it to make up deficits while it is building up a volume of business, which in time it hopes will be profitable. If the light and power companies had the same apparently inexhaustible resources they would gladly call upon them to stand the serious losses which are inevitable if, for instance, they cut their rates in half, as is now being advocated by some agencies of the Government.

While as a rule reduced rates will increase and stimulate consumption, it does not necessarily follow that large reductions will correspondingly stimulate much larger uses of electricity. The character and habits of a community, its average income, the availablity of other competing fuels, such as coal, gas and oil, in communities such as ours, for instance, where these are cheap, are bound to have a considerable influence on the use that people may make of electricity. These very large consumptions running up to 1000 or 1500 kwhr per annum per average domestic customer which the Federal Government says are obtainable can only be secured by the use of such major appliances as electric ranges, electric refrigerators and electric water heaters, appliances which are not within the reach of everybody's pocketbook.

No one, of course, can state with any degree of assurance that the rates now charged by the TVA will pay the cost of operations and a proper return on the actual investment. Until that has been demonstrated, how can it be urged with any degree of fairness that the electric companies throughout the United States should follow in the footsteps of TVA and adopt their rates? In my judgment, experience will prove that when all the elements of cost have been properly taken into consideration, the TVA rates will result in losses for the Government.

If, as stated by the President, the power policy of the TVA is to be extended into all the states, we will have an agency of the Federal Government doing business with a free foot within the borders of a state, subject in no way to the sovereign rights of the state to control and regulate its activities. The Federal Government—although a competitor—claims that it is not subject to the regulation and control of the state to which the private company, with which it may compete, is subject, and that because of this it may fix rates as it pleases, it may adopt accounting practices as it pleases, it may pay taxes or not as it pleases; it may, if it sees fit, establish rates sufficiently low to take the business away from the private company, and by subsequent publicity, as has already been done, show large savings to consumers and thus create a demand from every municipality for its power, thus not only destroying the private company, but also fostering unfair competition with gas, coal and oil.

Effect of the Administration's Power Program Upon the Value of Public Utility Securities

A decline of nearly 40 per cent in the market value of the common stocks of sound public utility operating companies has occurred since the October, 1932, levels, which is the period immediately preceding the President's election. This percentage of decrease, if applied to the five billion dollars of utility common stocks, represents a loss to investors of nearly two billion dollars. That this loss is largely due to the policy of the Administration is clearly shown by the market reactions which immediately followed each pronouncement of the Administration on the power issue.

The announcement of the Tennessee Valley project, the heavy increase in utility taxation, the publicizing of the TVA rate yardstick, the purchase contract with the Knoxville Public Service Company, the speech of the President at Tupelo, each resulted in material decreases in the market value of common stocks of operating companies. This is all the more significant in that these decreases were made even in the face of a steady improvement in the sales of electricity, which are now some 10 per cent above the pre-Roosevelt levels.

Does the TVA Constitute a True "Yardstick"?

After one year's operation it may truly be said that the TVA "Yardstick" will have to be lengthened by government fiat to measure the depth of its own losses

By Bernard F. Weadock

Vice-President and Managing Director, Edison Electric Institute

An Address Delivered Before the Eastern Savings Division of the American Bankers Association, March 7, 1935

ONE of the most treasured possessions of the British Empire is the Imperial Standard Yardstick, now nearly 100 years old. It determines an exact length, under certain specifically defined conditions, as the distance between two fine lines engraved on gold studs sunk in a bar of bronze.

Governments have now departed from the exactitude and permanence of their standards and have adopted such units of measurement, both monetary and physical, as will best suit the expediencies of the moment. It is of one of these latter, the so-called "yardstick" for the measurement of private electric power operation, that I have been asked to discuss with you today. The special punitive legislation which the "yardstick" does not disclose will be a large element in such discussion.

1,800 Yardsticks—and None the Same Length

We have had Government operation of electric plants ever since the beginning of electric service. In the fifty-odd years of the existence of the light and power industry in this country, there have been established altogether some 3900 municipal electric systems, each of which has constituted a yardstick. The back-yard of the industry is full of all kinds of yardsticks in the shape of the 1800 municipal plants still operating. Each yardstick is of a different length and it assumes a different size when measured by any one of the thousand others and, to this bewildering array of standards, the Federal Government is now busily engaged in adding still more. After a half century of operation, privately owned electric light and power companies are producing 95 per cent of the power supply of this country, which is almost equal to the power consumption of all the rest of the world combined. Surely this number of plants over such a length of time has provided a yardstick of municipal ownership.

By far the most celebrated of these new measuring devices is the "golden" TVA yardstick. Does it constitute a

MR. WEADOCK

true measurement? What doesn't it show?

A Long Time A-Borning

The Tennessee Valley Authority was a long time a-borning. It was finally created May 18, 1933, and the custody of the Muscle Shoals properties was reposed in it. In addition to the original $125,000,000 sunk into this enterprise, Congress has appropriated approximately $100,000,000 more, while Dr. A. E. Morgan, chairman of the TVA, has testified before the Appropriations Committee of the House that the Authority contemplates seeking additional appropriations of approximately $200,000,000. The ultimate cost, if the complete project is carried out, will be more than one billion dollars, according to reports.

The TVA, created by an Act of Congress, immediately proceeded to incorporate its subsidiary companies, one in the State of Delaware, another in the State of Tennessee. I will not undertake to dig out of the budget reports the cost or contemplated cost of these subcompanies.

The practical effect of the organization of the TVA is to serve people and industry in a territory embraced within some 45,000 square miles of territory, included in the states of North Carolina, Virginia, Alabama, Tennessee, Georgia, Mississippi and Kentucky. So far, its operations have been confined to the states of Alabama, Tennessee and Mississippi. The proposal is to spend a billion dollars in territory served by private electric light and power companies whose investments within the area of the Tennessee River are hundreds of millions of dollars; where the present excess generating capacity is 66 2/3 per cent; where the people in rural communities as well as the cities receive an unexcelled service at fair rates.

Amelioration of Valley No Novelty

The amelioration of the Tennessee Valley is no new thing and spasmodic efforts have been made toward that goal by the Government ever since President Monroe directed attention to it in his annual message in 1824. At that time he presented the annual report of his Secretary of War, John C. Calhoun, recommending a survey of Muscle Shoals as one of the three great works which he regarded as most important for the improvement of transportation conditions in the United States. A grandiose scheme for enlarging the usefulness of the river was begun, but work on it lagged, and there being no provision for maintenance, all that was left fifty years later were the rotting timbers and crumbling banks of an abandoned canal.

Subsequent efforts to improve navigation at that point proved futile. With the war hysteria rampant, the Government authorized the construction of nitrate plants at Muscle Shoals. These plants were obsolete before they were completed. Little, if any, nitrates were produced and as a result of the war we find ourselves with a total investment of upward of a hundred and fifty millions of dollars, a hydroelectric plant, and an unworkable nitrate plant.

Long before the war, the Muscle Shoals Hydro Electric Power Company, a company affiliated with the Alabama

Power Company, had expended $500,000 in engineering studies and investigation, preparation of plans and specifications for the dam and power house and for acquisition of lands to build a private hydro plant at the site. With the outbreak of the war, the United States sought to acquire the property of the Muscle Shoals Hydro Electric Company for a site for a water power plant to be operated in conjunction with a proposed nitrate plant, but was unwilling to pay its value as a water power site, and the Government declined to remunerate the company for the expenditures it had made. The company, however, very patriotically donated the property to the United States and received a letter from the Secretary of War expressing appreciation and thanks for "the company's generous and public-spirited action." Subsequently, the company received a check of the United States Treasury for One Dollar, which represented payment for an expenditure by the Alabama Power Company or its affiliates of $500,000. An amusing but ironic aftermath to this transaction was the assessment of a $500 fine against the Alabama Power Company because the company had reproduced the One Dollar check in some of its literature. Federal officials had found the company guilty of violating the law prohibiting reproduction of checks of the United States!

Work on the dam and power house by the Government was intermittently carried on until its completion in 1925. The project was operated and maintained by the War Department up to Aug. 15, 1933, on which date it was transferred to the Tennessee Valley Authority. The output of power was purchased from the Government under short-time contracts by the Alabama Power Co., which still takes the great bulk of the Muscle Shoals production.

Taxpayers Money Down the "Gopher Hole"

Let us further examine this "gopher" hole down which the American taxpayers' money—your money and mine—has been poured. Government records disclose that the nitrate plants and power dam and stations have cost the Government in the neighborhood of $150,000,000 and the part allocated to power is determined in the annual report of the Chief of Engineers, U. S. Army, for 1934, to be $47,026,236 for Muscle Shoals as of Aug. 15, 1933. To this should be added the cost of the Sheffield Steam Plant, which has been given as $12,880,000, making a total in round numbers of $60,000,000.

The Chief of Engineers of the U. S. Army did not include in his calculations an item of some $30,000,000 consisting of the accumulated interest upon the bonds issued by the U. S. Government to raise the money to construct the project and also to pay interest upon the interest on the bonds which went to the construction.

Concealed Interest—A Fundamental, Highly Important and But Little Considered Difference Between Private and Government Reckoning

Let me point out to you a fundamental difference between Government and private reckoning. It is one which has received very little attention and yet its obvious arithmetic constitutes an almost hopeless handicap on private business in competition with its government. When a power company builds a dam it usually has to borrow money to pay for it. Bonds are sold and the enterprise pays the coupons and the books of account show such payments. Until the plant begins operation, interest during construction is commonly added to the actual construction expenditures. After the plant goes into operation, interest must be provided for from the revenues of the enterprise. It is all simple and aboveboard.

Not so with Government finance as usually practised.

Regardless of the fact that bonds have been sold, the cost of a Government project, as such cost is reckoned by the Government, only represents the actual out-of-pocket payments for the job. Interest on any specific project disappears into that convenient catch-all entitled "Interest on the Public Debt," an item of the Federal budget that has reached the stupendous proportions of $757,000,000 per annum, as shown by the report of the Secretary of Treasury for the last fiscal year. The fact that additional bonds have to be sold to pay interest on the money borrowed to build these projects is rarely, if ever, mentioned and the Government's cost accounting for its individual projects ignores this very real element of cost.

The Quicksand of Compound Interest

The Government is a vast continuing business enterprise and since, in the last analysis, a penny spent is a penny borrowed, this treatment of interest means that the Government must borrow somewhere the full equivalent amount from somebody else. It entails the borrowing of more money with which to pay this interest and the inevitable burden upon the Government of further interest upon the money so borrowed, until at last the taxpayer may be sunk in a quicksand of compound interest, in which case the only escape would be the complete writing-off of the debt at the expense of the investors.

The U. S. Army Engineers operated Muscle Shoals from its completion in 1925 to 1933. The reports of that operation are in the usual straightforward style of the Army. Interest charges upon the investment were omitted, but the reports show that the Alabama Power Company paid the Government various amounts averaging over the period about $600,000 a year, and that the out-of-pocket expense of the Army for direct labor and materials for the operation of Wilson Dam was approximately $200,000 per year.

Taking these items into account and estimating the accumulated interest costs each year as best I can at the average rates paid by the Treasury on its interest-bearing public debt, the total cost to the people of the United States of the Muscle Shoals Dam alone stands today, in round figures, at $70,000,000 instead of the $47,000,000 stated in public documents. In other words, the taxpayer has already been compelled to feed this monumental white elephant $23,000,000 worth of hay.

Fodder for the "White Elephant"

This cost of fodder for the Muscle Shoals white elephant does not include more of the same kind delivered to the Sheffield Steam Plant, which cost approximately $13,000,000 to build. It was paid for out of funds supplied by various Liberty Loans. Some of these Liberty Loans have been retired by the taxpayer. It still remains the fact, however, that the accumulated interest which was paid for out of other funds has not been retired and the taxpayers of the United States are still "in the red" by at least $7,500,000 of accumulated interest on the money used for construction, less rentals paid for the use of the plant by a power company and operated during a few months of severe drought. The present net cost to the country of these hydro and steam plants is thus at least $77,500,000.

This figure of $77,500,000, as will be discussed later, by no means covers all of the cost to the taxpayer. There are no financing charges to cover the cost to the Treasury Department of collecting the funds which were spent on the project, no allocation of general expense for legal and accounting services rendered

by the Department of Justice and the Comptroller General's office, no share of the general overhead expense of the Federal Government in Washington. If these were added, the capital cost would be materially increased and operating costs would be substantially enlarged.

In his recent testimony before the House Committee on Appropriations, Dr. Morgan, chairman of the TVA, testified that the TVA proposed to write-down the Muscle Shoals power plants on its books to $20,000,000. This is a shrinkage of almost 75 per cent. In the recent Tennessee hearing, the alleged value of these power plants was fixed by the TVA at $29,675,000. At another hearing in Alabama the other day, the same people gave the value as $21,448,-800. The figures move about with the unpredictable jerks of a Mexican jumping bean.

A Further Look at the Integrity of the "Yardstick"

Let us look further, then, at the integrity of the yardstick of the TVA and determine from its public statements and public documents its value and accuracy as a means of measurement. Some features of its operations are well known. A few of the advantages which it enjoys and which the yardstick does not disclose may be listed as follows:

No share of the overhead and general expense of the Federal Government
No financing expense
No interest charges

As has been shown, these are real costs to the taxpayer, but they are not counted against the Muscle Shoals operation.

No insurance charges; the Government carries the risks.

No regular state taxes to pay.

No real estate taxes.

No automobile taxes.

No gasoline taxes.

No Federal 3 per cent special utility tax.

No Federal income tax.

None of the remaining 40 odd taxes paid by private utilities. Only is the TVA under its Act required to pay 5 per cent of the gross proceeds received from the sale of power. The TVA sells power at wholesale so that this charge will be comparatively small. Last year private power companies of this country paid on the average of 14 per cent of their revenue back to various agencies of government in the form of taxes.

The TVA enjoys:

Rebates on railroads for both passenger and freight service
Free postage
Free use of the services of other governmental departments, including at various times an army of CCC and CWA workers
Free use of office in government post office and other buildings
Free legal advice
Immunity from the expense of regulation
The privilege of keeping its accounts to suit its own purposes, including the charging off of power costs to social uplift, national defense, navigation improvement, etc.
The amount of this arbitrary write-off is to be from 50 to 75 per cent of cost.

The TVA also enjoys Government prestige which permits it to coerce prices by threat of cut-throat competition, as illustrated by its treatment of the cement industry in the Tennessee Valley.

With all of these inches chopped off the yardstick, surely there can be not much more than half remaining.

It is difficult to escape the conclusion that the entire undertaking is to be regarded wholly as a public function supported at the public expense of 95 per cent of the taxpayers of the country non-resident in the Valley and who cannot possibly receive any direct benefits. If it is to be compared with enterprises which must pay their own way according to accepted standards of general business, the first year of operation has left it far in the red.

TVA's Sales

TVA has thus far been selling electricity at wholesale to its affiliated distributing municipal systems for almost a year and during this period its sales to *new* customers have been about 2 per cent of the output of Muscle Shoals. The total distribution by the TVA has not greatly exceeded in quantity the amount of electricity used by any single large department store in the City of New York. Its fiscal year ends on June 30 and I do not know what its income statement will look like, but I venture to suggest that its total power revenues will be less than interest and depreciation even on the $20,000,000 to which it has reduced the book value of Muscle Shoals.

Here we come to one of the paradoxes of the situation.

There is already an excess generating capacity of 66 2/3 per cent in the Tennessee Valley. The private plants there can take care of all the business even if activity should return to the peak year of 1929. Yet the Government is busily engaged in building two more huge hydro-electric plants — Norris and Wheeler—which will not only add their own capacity to the total, but will increase that at Muscle Shoals by providing more water at the low-river season of the year. Unless more business develops—and develops very soon on a large scale—all that will happen will be an additional compounding of interest and a further capitalization of deficits.

After one year's operation it may truly be said that the TVA "yardstick" will have to be lengthened by Government fiat to measure the depths of its losses.

An "Unholy Alliance"

There is in existence in America today an alliance of several interconnected and interrelated socialistic groups which by their interlocking activities seek to soviet-ize all basic industry and work for the common purpose of abolishing private business and establishing Government ownership and control. Among the more prominent of the organizations constituting such an "unholy alliance" are the Public Ownership League of America, the League for Industrial Democracy, the National Popular Government League, Peoples Legislative Service and the Socialist Party. This "unholy alliance," in their efforts, has said:

"If superpower cannot be socialized, and that promptly, the whole cause of industrial democracy will be indefinitely delayed."

The other industries which they name specifically are Government Ownership of coal, oil, ore, steel, power, telephone, radio, telegraph, express companies, government insurance, ships, railroads and "many businesses now considered private." The members of this alliance have affiliated with each other in their efforts by interlocking control and systematically dividing the work to be done along different lines. One group spreads the doctrine in schools, colleges and universities, another group is for the purpose of spreading general publicity, another to do the lobbying for the cause, and still another the actual campaigning for municipal, state and Federal ownership and "democratic control," with such assistance from group to group as may be desirable.

Half-Truths and Distortions

They have deliberately and maliciously told half-truths and have distorted facts so cleverly and so ingeniously to render difficult the pointing out of the falsehoods upon which their campaigns have been builded. They have called meetings of Senators and Representatives in the public office of a United States Senator, and have there advanced

their scheme and laid out their campaign of attack against the electric light and power industry and for public ownership of private business and of so-called public superpower. They have drafted bills for introduction into Congress adversely affecting the electric light and power business and in furtherance of their progress and have predicted long before their introduction that they would be introduced.

They have prepared misleading and deceptive material of their own hue and have placed it in public documents so as to get something "official," and have then distributed these public documents in franked envelopes of Senators of the United States, broadcast throughout the land at public expense.

They have kept roll-calls of votes of Senators and Representatives, in an effort to coerce and intimidate those gentlemen in the execution of their public duties by sending the roll-call, with deprecatory literature, to the home town or to the public generally.

They have upbraided Senators for their votes, when that vote conflicted with their preconceived scheme. They have used their influence with certain members of the staff of the Federal Power Commission to prevent the issuance of permits and licenses. They have ridiculed public officials, from the office of President down, because these officials did not subscribe to their doctrines.

They have sought to formulate public opinion through the press, and then have ridiculed "the capitalistic press" for printing their stuff. They have for many years carried on this and kindred activities. They inspired, instigated, lobbied for and obtained the present Federal Trade Commission investigation of the electric light and power industry as a means of getting publicity to use in their concerted plan of soviet-izing American industry. They predicted the investigation three years before it occurred.

In the year 1924 they were instrumental in introducing into Congress a Federal superpower bill. The main features of the bill were:

"A nation-wide public superpower system;

"* * * the most economic utilization and development for the production of electric power;

"The coordination of irrigation, flood control, navigation and hydro-electric power production in order to secure the best results for all;

"Federal aid to states, cities, counties, districts and other political subdivisions in the development of public superpower systems and service at cost, each project to be so organized and conducted as to pay for itself;

"A bond issue of $500,000,000 by the federal government to provide a revolving fund for the initial financing of the system;

"It is specifically provided that the government power system at Muscle Shoals be placed under the control of the proposed public service commission to be completed, developed, and extended as found practical and made a part of the general public superpower system;

"* * * The Boulder Canyon project on the Colorado River shall proceed as rapidly as possible with the development of that project as provided for by the Swing-Johnson bill now pending in Congress."

The great resemblance of this bill of over 10 years ago, fathered by these organizations, to the present Public Utility Bill introduced this year is amazing! It is rather striking too that we find the Federal Government actually granting money, by gifts and loans, to municipalities desiring to construct competing electric light plants, as was predicted in the year 1924! This group has lobbied and was instrumental in the adoption of the 3 per cent Federal Tax, which tax applied to the privately owned and operated electric light and power companies alone and specifically excludes the publicly owned and operated plants from the same tax.

They likewise lobbied for the enactment of the Johnson Bill, which denies to the electric light and power companies the protection of the Federal courts universally enjoyed by all the other citizens of the United States.

They likewise now are lobbying for a bill to prevent suits being brought against the TVA by demanding exorbitant and unreasonable bonds as a prerequisite to bringing such suits. According to a United Press report from Washington, it is stated: "Anybody who wants to sue the TVA must be willing to gamble a large amount of money that he will win. He must post a bond, guaranteeing that if he loses the suit he will reimburse TVA for the money it spent on lawyers' fees and for the money it lost by not selling power while the case was being heard. . . . And they say the same principle might be extended to other New Deal projects, such as NRA, which is being harried by one adverse decision after another."

They are likewise instrumental in having introduced and are lobbying for Senate Bill 1417, which involves the Government Ownership and supervision of the bituminous coal business, hearings on which are now pending. This bill contemplates the expenditure of $300,000,000 for the purchase by the Government of coal reserves and marginal mines.

At a meeting of one of the organizations held in Washington only last month, it was stated that they desire Government Ownership of banks and said: "The time has come when absolute ownership and absolute control by the Government (of the banks) is made necessary to safeguard the rights of both the rich and the poor."

The Public Utility Law of 1935 now pending in Congress contains provisions not only abolishing all utility holding companies, but so shackling operating companies by Federal regulation as to eliminate most of the economies made possible by the engineering advance of the last decade and so prevent the continuance of the excellent service rendered. By destroying the holding company, the operating companies are rendered more vulnerable to attack by this group which seeks public ownership of them.

In holding unconstitutional the Tennessee Valley Authority Act, Messrs Baker and Beck, eminent counsel, state in their opinion to the Edison Electric Institute:

"To suggest that the power to regulate means the power to engage in interstate commerce would be fantastic were the consequences not so grave. For if the Federal Government may engage in one business merely because it is an interstate business (and it is contended that it may similarly engage in all manufacture and production which precedes or intrastate commerce which succeeds such interstate commerce), then it may engage in all; and if it may engage in them in any degree, it may make them Government monopolies. By such an interpretation the Constitution would become a fundamental framework for the creation of a Communistic State. Manifestly, no such meaning or result can be attributed to the Federal power to regulate interstate commerce."

Under these circumstances, is it not time to realize the gravity of the situation? During the debates of the Constitutional Convention of 1787, George Mason of Virginia made the following prophetic statement:

"By an inevitable chain of causes and effects Providence punishes national sins by national calamities."

All American industry is vitally interested in this question. It must consider what it desires to do in order to protect its properties from the malicious and vicious attacks of those who would destroy it.

I submit that the "golden" yardstick of the TVA is not a true measure of private vs. public ownership; that it is a birch-rod of destruction.

Meter Installations and Service Rebuilding

By F. E. Davis

The Commonwealth & Southern Corporation

Presented at the October meeting of the Electrical Equipment Committee.

WHERE climatic conditions permitted, such as in many of the Southern sections of the country, meters have been generally installed on front porches or back porches or other semi-protected places where access to the meters did not require entrance to customers' buildings. In other sections, indoor meter installations have been generally considered more suitable. In recent years, however, it has become necessary to give more consideration than ever before to meter location and installation, particularly the location and installation of meters outdoors, due mainly to three more or less fundamental causes: First and probably most important, the cost of service entrance and meter installations had risen to a point so high that further increase in domestic energy sales by the addition of major appliances was seriously hampered. This condition was partly due to requirements of inspection authorities, which in some instances at least had the indirect sanction of the utilities. In some cases utility requirements for their meter installations were responsible. Second, the problem of current theft had become acute due, to some extent, to the pressure of the times and to the existence of many unenclosed or inadequately enclosed installations. Third, increasing difficulties in meter reading and servicing due to locked premises, where meters were installed indoors, required changed installation methods to at least minimize the problem of repeat calls and billing troubles. The seriousness of this situation can best be illustrated by citing the fact that in some localities as many as 15 per cent skipped readings in one month have been recorded. The present increased difficulties seem to be due to changing habits of the people in their mode of living, so they cannot be considered as temporary.

In our group of properties the outdoor meter installation first became desirable in rural and resort territories in the North due to meter reading and servicing difficulties. At the same time, however, in the South particularly, current theft was becoming more of a problem even where meters were generally installed outdoors. At first, in the North, an attempt was made to have the customers build wooden cabinets on the outside of their houses or cottages in which the meter and service equipment could be placed, but it was found practically impossible to get suitable enclosures provided due to high cost and unsightliness. The next step was the use of an outdoor type combined meter and switch enclosure made of steel, but this was not particularly satisfactory due to its comparatively high cost and the fact that the switch and fuses were located on the outside of the premises. These same combinations were tried in the South, but they were not found to be an answer to the theft problem. The customer owned the switch and meter enclosure and could always claim access to it if only to replace a fuse. It became apparent that it would be necessary to separate the company's equipment entirely from the customers' equipment if access to unmetered connections was to be prevented, and such separation would make possible the location of the service entrance switch and fuses inside the customers' premises and the meter outside, where it could be effectively enclosed. This type of connection also offered possibilities in reducing the total cost of service entrance installations. Many of the gadgets that had been added to service entrance switches for the convenience of meter installation could be entirely eliminated and through redesign the cost of service entrance switches reduced. The National Electrical Code, at that time, however, required that the meter be placed on the load side of the service fuses and did not permit the proposed connection of the meter ahead of the service entrance equipment, but Code approval for the meter, switch, fuse sequence of connection was finally secured.

The original plan for meter installations in the new sequence was to house existing types of meters in steel enclosing boxes when located outdoors and to use a small steel box for enclosing the wiring but not the meter when located indoors. Usually these boxes also enclose a safety disconnecting device, which device or its equivalent is considered necessary by many operating departments, since no fuses are installed in the service conductors ahead of the meters. Later, die cast aluminum outdoor type boxes became available at reasonable cost and have been used extensively. The use of boxes, however, has been considered by many to be a makeshift method and in an effort to make their use unnecessary, the American meter manufacturers were requested to develop a meter and mounting suitable for either indoor or outdoor locations and which in mounting details would be the same for all manufacturers. The development of a standardized meter would also permit better standardization of installations.

Over a period of several years the manufacturers have developed and marketed a number of meters suitable for outdoor use, but, in general, none was favorably received until the type S and type A meters were made available. The type S meters are detachable and mounted on standardized sockets. The type A meters are similar to past types except the bases are made of die cast aluminum and standardized as to salient dimensions and terminal facilities. By the addition or interchange of certain standardized facilities the type A meter may be converted into either the type B or C as desired.

Either the so-called type S or type A-B-C programs for meter installation offer considerable advantages over the use of boxes. They may be used in all meter locations whether indoor or outdoor, all exposed parts are of non-corrosive material, they are comparatively inconspicuous when in outdoor locations and, in general, the cost is less than meters plus boxes in which to mount them. Standardization of installation methods to a greater extent than before is also practicable.

Three general programs are now possible: First, to continue the use of boxes; second, to use the type A-B-C meters where new meters are purchased and enclose the existing meters in boxes when mounted outdoors, and third, to use the type S meters where new meters are purchased and either enclose the existing meters in boxes or rebuild them

to the type S. If service rebuilding on a large scale is not considered, and meters are located outdoors in a majority of new installations, the two latter programs will, in general, be the more economical in the long run.

It has been determined that meters of the existing types can be rebuilt to the type S at approximately the same cost that a die cast aluminum outdoor meter connection box equipped with simple disconnect facilities can be provided to enclose the old meter. A steel box with or without disconnect facilities would be somewhat more economical from the first cost standpoint but experience with steel boxes of the best quality indicates that troubles from rusting will eventually be encountered. It will probably be necessary to paint steel boxes inside and out at least once during their lifetime, perhaps periodically, to prevent an unsightly condition on the buildings on which they are used and if so, the cost of painting will more than offset the additional cost of an aluminum box or the rebuilding of older type meters to the type S.

It is the practice of the Commonwealth & Southern properties for all to use the same methods in making their meter installations. Boxes for both outdoor and indoor installations have been used for several years but the economics of either the type S and type A-B-C programs made it desirable to change present methods. Since from a capital cost standpoint there was so little to choose between the type S or type A programs as described, the decision as to which method should be adopted as standard was put directly to the operating companies. This resulted in unanimous agreement to use the detachable type meters throughout for new and changed meter installations, both indoor and outdoor. An important factor in this decision was the possibility of complete standardization for new installation since the same mounting facilities could be used in all cases.

Our present program with respect to single phase meter installations is summed up in the following paragraph quoted from our service rule book:

"Single Phase Installations, 100 Amperes Capacity or Less: On all new installations or existing installations that are to be rearranged in any way that affects the service entrance conductors or service equipment, the meters shall be installed outdoors with the Company's standard meter sockets except in those few cases where outdoor locations are not suitable. Where outdoor locations are not suitable, the meters may, with the Company's permission, be installed indoors in suitable locations with standard meter sockets. These meter sockets will be furnished by the Company but installed by the customer."

Our plan regarding the rebuilding of meters is summed up in the following paragraph quoted from our meter department bulletin on the use of the detachable meter:

"Rebuilding Old Meters to the Detachable Type: Parts are available from the meter manufacturers to convert meters of all types manufactured since 1914 to the detachable type and it will, in general, be found necessary to rebuild a number of these old type meters each year. However, it is recommended that in so far as practicable only meters purchased since 1926, which have both overload and temperature compensation, be rebuilt. Should it be found necessary to convert meters purchased prior to 1926, the newer meters of these types should be chosen for conversion. In no case should meters purchased prior to 1914 be converted to the detachable type."

The meter socket has met with the universal approval of our metermen, the electrical inspectors, and the wiremen and contractors who have installed them. The only difficulties of moment encountered have been in certain group meter installations and are mechanical in nature. When proposed developments for multiple installations progress to a point where they will be entirely satisfactory, it may then be possible to standardize on a single socket for the single meter installations and thus bring about a more complete standardization for the detachable meter mountings.

Service Rehabilitation

A number of operating companies, particularly in the Middle West, have found it desirable to move large numbers of meters installed in indoor locations at present to the outside of customers' premises. Generally, the justification is based on the decreased costs of meter reading and service expense and the diminution of meter tampering and the resulting energy diversion with its attendant complications. One company with a very elaborate rebuilding program has found their program justified from the standpoint of increased total registration of the meter alone. Another company with a program equally as elaborate gives more weight to meter reading difficulties and the desirability of keeping company employees out of the customers' buildings. In the Commonwealth & Southern properties it is found that the rebuilding of all installations where tampering is indicated or suspected is justifiable and possibly a considerably larger number of installations

(*Continued on page* 88)

Convention Proceedings of Utilities Commissioners Association Now Available

PROCEEDINGS of the National Association of Railroad and Utilities Commissioners for 1934 have been published and are for sale by the State Law Reporting Company, 30 Vesey Street, New York City, the official reporter of the Association. The proceedings contains 500 pages and is priced at $6 per copy.

The 1934 Proceedings volume contains discussions by Federal and State experts on:

Regulation of motor vehicle transportation on highways in competition with the railroads.

The Johnson Law, limiting the jurisdiction of the lower Federal courts in cases involving the validity of State orders.

Valuation of utilities—the proper rate base, reproduction cost, depreciation and "going concern" value.

Elimination of railroad gradecrossings and the use of Federal funds therefor.

Both Federal and State authorities are represented in the volume through addresses delivered at the November convention of the Association. Included are:

For the Federal Government—

William E. Lee, Chairman, Interstate Commerce Commission.

Joseph B. Eastman, Federal Co-ordinator of Transportation.

Ernest I. Lewis, Director of Valuation, Interstate Commerce Commission.

Clyde L. Seavey, member of Federal Power Commission.

E. O. Sykes, Chairman, Federal Communications Commission.

Frank R. McNinch, Chairman, Federal Power Commission.

Paul A. Walker, member of Federal Communications Commission.

For the States—

Andrew R. McDonald, of Wisconsin, President of the National Association.

Homer Hoch, Chairman of the Kansas Commission.

Jesse W. Greenleaf, member of Kansas Commission.

Albert J. Stearns, Chairman of Maine Commission.

E. K. Murray, Director, State of Washington Commission.

Kit F. Clardy, former member of Michigan Commission.

Alvin C. Reis, Counsel for Wisconsin Commission.

Holmes Baldridge, Attorney for Oklahoma Commission.

The 1934 volume also includes many reports from standing and special committees of the Association.

McGraw Prize Paper

Engineering Necessary in the Development of an Extensive Low Voltage Network

By James L. Holton

IN a majority of construction projects such as bridges, buildings, and other structures, the engineering consists in making a thorough preliminary survey and preparing a set of plans which describe the structure to be built in every detail. Although a large staff of men may be needed to produce the necessary detailed drawings and specifications, relatively few engineers are needed to take care of the unforeseen problems which may arise during the course of the actual building operations.

On the other hand, the engineering connected with the building of a new electrical distribution system, in a territory where a system exists, is a continuous one and requires that a large staff of engineers be available from the time the project is proposed until it is finished. The staff of engineers should be divided into two groups. The first group does much the same work as the men who engineer the construction of a building; that is, they prepare detailed plans for definite portions of the system. The second group, however, does much more general and at times more difficult work. They decide where and when construction shall be done, indicate in general how the plans should look when completed, and arrange for the efficient accomplishment of the changeover with little inconvenience to consumers. It is the purpose of this paper to outline the manner in which a company may carry out this second type of engineering in connection with a project where the new system being built is an extensive underground low voltage network and the system being replaced is of the radial type.

While it is intended to dwell mostly on the subject of engineering rather than to describe any or all of the distribution system, it will be necessary for an understanding of the methods used to insert descriptions of such things as the territory served, the fundamental system plan, and records used as a basis for calculations.

Territory Served and Type of Load Encountered

The territory considered is typical of a community where it would be advisable to install a large underground network. It has an area of about 100 square miles and a population of about 1,000,000 people. Of this total area, 90 square miles are developed, the remainder being parks, cemeteries, golf courses, bodies of water and marshy or unclaimed land. A considerable amount of the developed land still is populated quite sparsely and hence should not be served by an underground low voltage network. However, the remainder of the developed territory, embracing about 60 square miles, has an average population density which has been estimated to be about 12,000 people per square mile.

MR. HOLTON

Mr. Holton is the winner of the second McGraw Award for 1934. After graduating from Renssalaer Polytechnic Institute in 1926 with the degree of Electrical Engineer, he entered the service of the General Electric Company at Schenectady, N. Y., as a student engineer. He left this company in 1928 to go with the New York and Queens Electric Light and Power Company, Flushing, N. Y., where he is now employed as Division Engineer of the General Engineering Division of the Inside and Outside Plant Bureau.

In general, especially in residential districts, the power demand on electrical distribution systems is proportional to the population. The community under consideration is fundamentally residential and, although there are numerous factories, the problems of supplying large blocks of industrial load such as the steel mills of Pittsburgh, or large blocks of commercial load such as the skyscrapers of New York or Chicago do not exist. Hence it will be seen that the relatively evenly distributed heavy load provides a basis for the establishment of what has become known in the last few years as a standard low voltage network.

Fundamental Plan

The first step in the engineering of any project of this kind is to prepare a plan for the entire territory, this plan to be considered fundamental and to be followed as closely as is practical. Such a plan covers the general routes of primary feeders, the location of transformers, and the most desirable arrangement of the secondary grid. Figures 1 (a) and 1 (b) show the primary and secondary layouts of an ideal network which might well be a part of the fundamental plan at a location where the estimated load calls for each transformer to supply eight blocks of the territory normally.

The primary feeders are three-conductor, 500 MCM shielded cable operating at 26,400 volts. The design is such that two of the feeders parallel each other along an avenue throughout their entire length.

Transformers are three-phase, 500 kv-a, with a ratio of 26,400 to 125/216 volts and have taps in the primary winding to allow adjustments when load conditions change or when the transformer is supplied by an abnormally long primary feeder. Attached to one end of each transformer is a primary disconnecting terminal chamber and to the other end an automatic network protector, the entire assembly forming a unit which can be handled easily. These network units are located in standard street transformer manholes spaced according to estimated load requirements for the area under consideration.

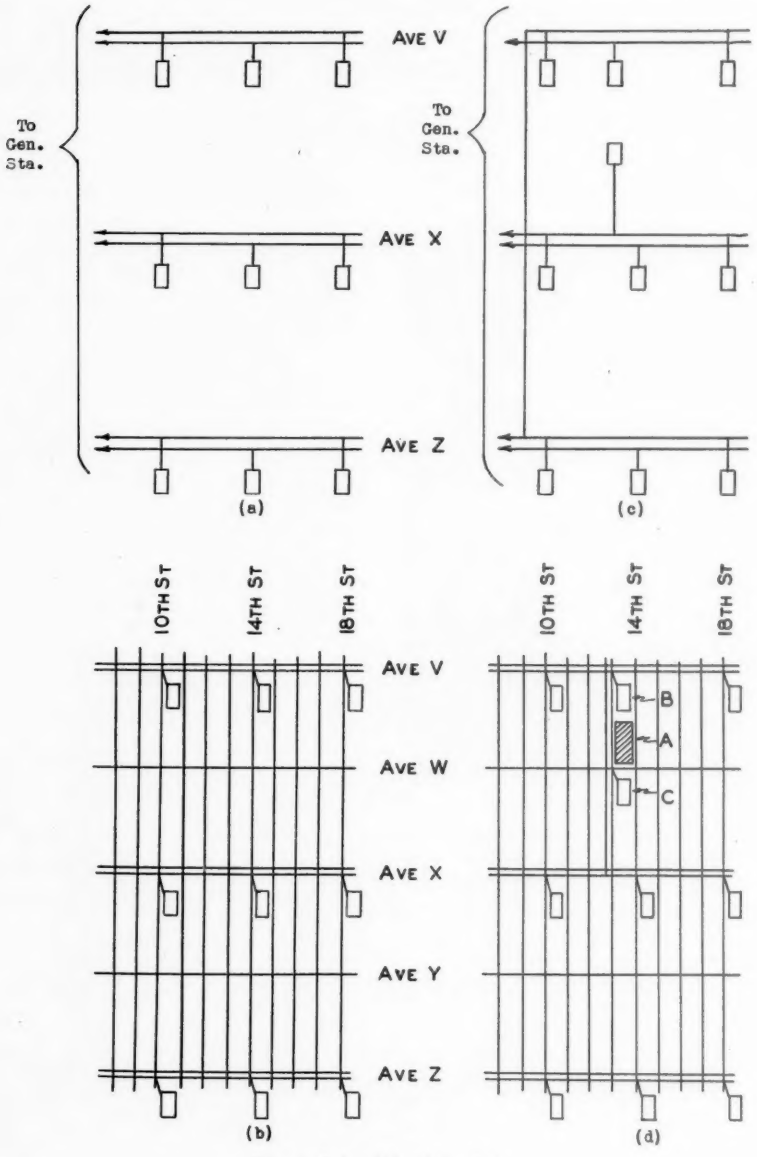


Fig. 1 (*a*), (*b*), (*c*), (*d*)

The secondary grid is made up of three 500 MCM phase wires and one No. 4/0 neutral wire. One set of these secondary cables is installed on every street and every avenue and they are tied solidly at every corner. In places where the load warrants a close spacing of transformers, double sets of secondary are installed on the avenues, one set on each side of the roadway.

Records Considered Necessary In Laying Out Extensions

In order to plan extensions to the network intelligently, it is necessary, of course, to have accurate records of the company's plant facilities available, and these records are usually kept by bureaus who work full time on the preparation and maintenance of such records. However, engineers may need additional information of a less detailed nature, and the following records are suggested as being suitable:

1. *One Line Diagram of System*

The 26.4 kv feeders which are to supply the network are assumed to come from at least two generating stations. Also since a considerable portion of the radial system exists, substations are still necessary and the substation transformers are connected to some of the same 26.4 kv feeders. A one-line diagram showing the generating stations and substations, together with the position of feeders on busses and the location of circuit breakers or disconnect switches should be prepared and kept up to date.

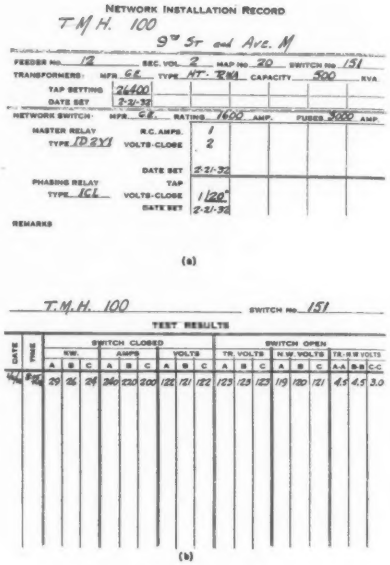


Fig. 2 (*a*), (*b*)

2. *Card Record of Equipment, Loads and Voltages*

Fig. 2 (a) and (b) shows the two sides of a card which may be used as a record of information on transformer installations. Fig. 2 (a) shows the side on which is kept information on the equipment installed, together with such adjustments as have been made on transformer taps and network relays. Fig. 2 (b) shows the side on which are kept all load and voltage readings which are taken at the particular location. A full set should be taken when the equipment is put into service or when any change is made in adjustments. Also routine tests should be made about every six months on all installations which have not been tested for any other reason during that time so that a recent record of load and voltage conditions everywhere on the existing network will be available at all times.

3. *Association Diagram for 26.4 Kv Feeders*

Fig. 3 shows a section of a diagram such as may be used to show the overall relation of primary feeders to each other. Minimum

FEEDER NUMBER	1	2	3	4	5	6	7	8
1			8			●		3
2					●	5	8	7
3	8						8	1 7
4				■				
5		●				2		
6	●	5			2		●	
7		8	8			●		2 3
8	3	7	1 7				2 3	

Fig. 3

voltages which will be tolerated with one, two, and three feeders out of service should be approved, and all cases where the voltage drops below these limits should be indicated on the diagram.

As an example of how this chart is used suppose feeder No. 1 were to be out of service for any reason. It will be seen that feeder No. 6 should not be taken out intentionally since the chart shows that the voltage will be below the limit which has been established. Likewise if feeders No. 1 and No. 3 were out of service feeder No. 8 could not be taken out. The square black spot on feeder No. 4 indicates that this feeder acts as a supply to a new section of the network and cannot be taken out of service, except during the offpeak hours, until the network is reinforced.

Procedure For Laying Out Network Extensions

Plans for immediate extension to the network may be prepared for any one of several reasons. In some cases it is decided at the beginning of the year that a definite area should be changed to network service and an item is put in the annual budget to cover this work. At other times a building, or several buildings, may be erected, or old buildings may change hands or be remodeled, the load at that particular location increasing correspondingly. If this load increase is in an area which is to be networked eventually, it will call for an extension at this time. Other situations calling for immediate action may be brought to light by consumers' complaints or the results of periodic voltage tests made on secondary circuits.

When it is decided that a network extension is to be made, an effort to fit the proposal into the fundamental plan should be started immediately. If transformer manholes are to be built, it will be necessary to decide whether they can be placed exactly where they were located on the fundamental plan or whether a compromise with existing load conditions must be made. Referring to Figure 1 (d) it will be seen that a sudden load growth in the building at "A" might cause a transformer to be installed at "C" and the location of "B" to be changed from Avenue V and 14th Street to Avenue V and 13th Street.

The arrangement of the secondary grid is very closely associated with the transformer location problem, it being necessary to provide sufficient secondary cables to supply the load even when primary feeders are out of service. In some cases the secondary as proposed on the ultimate scheme is sufficient to give good voltage for all reasonable contingencies. However, in cases such as that shown in Figure 1 (d), calculations probably will show that double secondaries are required on 13th Street in order that voltage can be maintained in the building at "A" when transformer "C" is out of service.

When the location of the transformers and the amount of secondary reinforcement are established, the problem of the primary feeders to be used is to be considered. Usually if feeders do not exist on the proper avenues considerable work is necessary to bring the feeders to these avenues. Referring to Figure 1 (a) and (c), both feeders on Avenue V will come from the generating station along this avenue eventually. However, for the time being, the installation of an additional feeder on this avenue may not be justified and consequently the arrangement in Figure 1 (c) is used, the second feeder being brought up from Avenue Z. To maintain the best diversity it is often necessary to change several transformers from one feeder to another in the process of constructing a new extension. Use of the association diagram is made in arriving at the best primary feeder arrangement. In general it is not wise to increase the number of feeders with which a given feeder is associated as it becomes more difficult then to arrange outages on that feeder for maintenance or construction work. The system diagram is consulted at this point also, as it is not advisable to associate feeders from the same generating station bus section very closely. If such associations were made, undesirable voltage conditions would arise on the network at times when trouble developed on that section or when it was out of service for cleaning or repairs.

When the general layout is in the form which seems best from the standpoint of company facilities a survey of equipment owned by consumers is made. If it is necessary to include additional work for converting equipment, or for new apparatus to provide service to the old equipment, the final plans are made to include these additions.

Procedure for Scheduling Network Extensions

When preliminary plans have been approved, the next job for the engineer is to coordinate the work on the detailed plans and the work on the actual construction so that the entire project will be completed as rapidly and as conveniently as possible.

The first step in the scheduling work is to get approval from all the bureaus, which are involved in any way, of completion dates for their part of the work. Figure 4 shows a section of a tabulation which may be sent to the bureaus which draw the structural and electrical plans and to those who do the subway construction and electrical construction. This sample list covers only the work on transformer manholes, but similar lists may be prepared for installation of duct banks and pulling of cable. These lists should cover a span of about three or four months so that supervisors may have ample time to schedule the work in their own bureaus.

When each bureau has agreed that it can meet the completion date specified or when the dates have been revised, if revisions are necessary, work on the detailed schedule for the coming month may be started. Each monthly schedule will consist of a series of jobs, and usually these jobs are so related that they must be done in a certain sequence. For example, if a transformer is to be removed from one feeder and tied to another, it should be obvious that the feeder from which it is being removed must be out of service first. Also the outage on the second feeder should be arranged as soon as possible after the first so that the transformer will be out of service as short a length of time as possible. A similar line of reasoning applies to a case where a whole section of cable, with transformers attached, is transferred from one feeder to another.

When the sequence of feeder outages has been determined from the nature of the work involved, an attempt is made to fit this sequence of outages into the number of working days in the month. Usually it is necessary to make some of them simultaneous, and care must be taken to consult the association diagram and avoid such outages on associated

TRANSFORMER MANHOLE		COMPLETION DATES						SERVICE DATE
Number	Location	Structural Plans	City Permits	Electrical Plans	Transformer Delivery	Subway Work	Electrical Work	
107	Avenue Z and 5th Street	3-16	4-13	4-16	4-20	5-4	5-8	5-20
109	Avenue X and 1st Street	3-19	4-16	4-19	4-23	5-7	5-11	5-20

Fig. 4

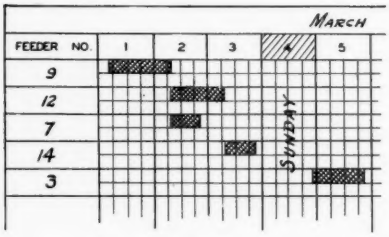


Fig. 5

Feeder #14 5:00 AM on 1-24 to 5:00 AM on 1-25

Work required before this item is started:

A. Pull and splice cable of feeder #14 on Avenue A from 9th Street to 10th Street. Tie dead cable tagged feeder #21(north) to new cable of feeder #14 (south) in MH-293 at Avenue A and 15th Street.

B. Tie dead cable tagged feeder #21 (south) in MH-307 at Avenue A and 20th Street to dead cable tagged feeder #25 (north).

C. Tie dead cable tagged feeder #25 (south) to dead cable tagged feeder #31 (north) in MH-311 at Avenue A and 23rd Street.

D. Complete work on the installation of a standard network unit in transformer manhole #34 at Avenue A and 9th Street and pull in cable from the transformer manhole to MH-264.

Work to be done after the feeder is taken out of service:

1. Open half-duplex splice in MH-260 at Avenue A and 7th Street. Make up straight splice making feeder #14 continuous along Avenue A.

2. Open straight splice in MH-264 at Avenue A and 9th Street. Make up half-duplex splice tying feedout from TMH-34 to feeder #14 going north and south. Restore feeder #14 to service.

NOTE:

The following secondary ties must be installed before the network switch in TMH #34 is made automatic:

On 9th Street from Avenue A to Avenue B
On 10th Street from Avenue A to Avenue C
On Avenue B from 9th Street to 9th Street

Fig. 6

feeders. Figure 5 shows a section of a chart which might well be the first page of a monthly schedule, since it shows the sequence and duration of feeder outages in summary form.

The details of the work to be done while a feeder is out may be written on a sheet similar to that shown in Figure 6. This sheet describes the work on primary cables in detail and outlines what other work must be completed before the feeder is taken out of service. To clarify the detailed description a diagram of the feeder in question before and after the work is done, with item numbers to show the various steps, should be attached. One of these diagrams is shown in Figure 7, this diagram to accompany the detailed sheet shown in Figure 6. Hence the detailed schedule for any month will consist of a title page, a summary sheet (Figure 5), and about 20 or 25 detailed sheets (Figure 6) with their corresponding diagrams (Figure 7).

For easy handling of a schedule of this nature a committee consisting of one construction man, one operating man, and one or two engineers should be formed. Several copies of the schedule should be sent to the construction and operating men so that they may distribute them to the members of their organization for approval. This distribution should be made about two weeks before the date when the operating department must have its final schedule completed. A meeting of the committee may be called about one week later and necessary changes agreed upon at this meeting. Such an agreement allows the men who are in touch with the actual work to have a hand in the schedule before it is issued to them in its final form, thus dispelling any idea that they are under the dictatorship of the engineer. Also, it allows the operating men to arrange other work, such as oil circuit breaker cleanings and relay tests, so that they may be done on the outages set up for construction work.

After the schedule committee meeting two or three days will be required for each member of the committee to check the changes suggested by other members to see if all persons involved in his department are in agreement. Thus, allowing the remaining two or three days for retyping of the detailed sheets and revision of the accompanying sketches, the schedule in its final form may be issued on time.

Of course, every effort will be made to do the work as scheduled, but very often trouble on associated feeders or very bad weather conditions cause a postponement of one or more jobs. Consequently the engineer's job is not finished when all plans are issued and the final schedule is approved. On the contrary, he must follow it until the last job is done to see that portions which must follow each other in sequence are done in that order in spite of postponements or cancellations. Often the hardest part of the scheduling is in trying to rearrange the work after the postponement of a key job in the middle of a monthly schedule.

The last task which the engineer has to perform in connection with a network extension is in the follow-up. Not only must he follow the schedule to make sure it is executed in the proper order, but he must check the operation of the whole extension to see that it is performing the service for which it was designed. The load conditions may have changed since the original estimate was made or perhaps some change in operating procedure has caused voltage to be less than was calculated. In any case the engineer must order tests to determine if all loads and voltages are satisfactory, and if they are not he must recommend changes to make them so.

Conclusions

A summary of the engineering necessary for the changeover of a radial system to an underground low voltage network system shows that the job starts when the decision in favor of network is made and continues until the last secondary cable is pulled. It shows that the type of engineering needed for such a project requires not only an ability to make technical calculations, but an understanding of the problems of the construction man and of the operating man. It is believed that the general principles outlined here may apply to changeovers involving other types of systems and in territories with other types and densities of loads, as well as to the specific case which has been considered.

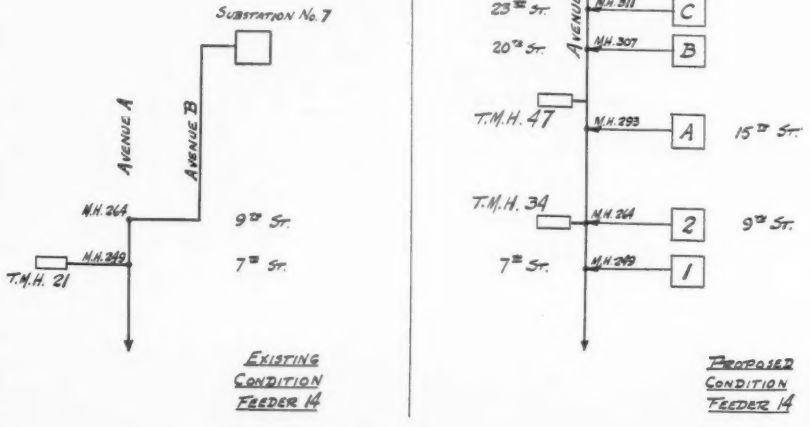


Fig. 7

Effect of Street Lighting On Accidents

By C. R. Beardsley

Brooklyn Edison Company

Third of a series of articles sponsored by the Accident Prevention Committee, Edison Electric Institute, W. A. Buchanan, Chairman

THERE is fascination and pleasure in driving over an unlighted winding road picking out the unfolding turns with the high beam headlights. Perhaps you may disturb a night prowling animal on search for courtship or kill. You continually explore a small section of unknown and changing world.

When, however, an approaching car tops the rise ahead and shoots you with the full glare of undimmed high beam, driving pleasure is replaced with a sense of utter helplessness. Real danger attends: that of sideswiping the other car especially if it be a truck with a wide unlighted side overhang; or of being ditched; or possibly of hitting an unlighted vehicle or a pedestrian whose presence in the driving lane, now a black tunnel, is unsuspected.

State laws exist prohibiting the dangerous use of overpowered or poorly adjusted lights, but they are not enforced. On main highways too many drivers make continuous use of the high beam. Only rarely encountered drivers respond in kind to a lowering or dimming of lights.

In cities at "blind" street corners, which are poorly lighted, even the low beam headlight should give a driver on a cross street ample warning, at reasonably moderate speeds, of the approach of a car he cannot see, but the city practice of driving with parking lights only, fails to make use of this projected light warning.

Thus it is clear that both on highways and in cities automobile lights, as safety equipment, have inherent limitations attending their use. The only really effective means by which drivers can escape headlight blindness is for communities to provide adequate highway lighting, so designed as not in itself to produce glare, so that the automobiles need not use bright headlights; and so that cars, wagons, pedestrians, obstructions, animals will be outlined against a background of soft well-diffused light or lighted surface. The intensity need not be high if all sources of glare are removed. Bare light sources of street lights, store windows, filling stations, electric signs, etc., should be masked. Both good taste and effectiveness of advertising value should lead to the avoidance of bare light sources.

The preceding observations express obvious facts, yet early mistakes or failures by communities to provide adequate street and highway lighting seem to be perpetuated through stale custom.

The recent sharp increase in auto accidents and fatalities (21,628 in 1925 to 36,000 in 1934) has focused attention on the necessity of drastic prevention measures. In order to ascertain causes and obtain statistical background, valuable studies have been made. Their data is available. (Note bibliography appended.) It is not the intention here to "crib" from the very fine analyses which have been made, but merely to emphasize their conclusion that the bulk of fatalities occur in twilight or early evening hours, under conditions leading to the statement that many driving hazards would be prevented by adequate lighting.

Good salesmanship on the part of lighting company commercial forces should find opportunity for a real revenue increase even in the face of restricted public budgets. The cost to a community of the excessive property damage, injuries and fatalities is demonstrable as being many times the cost of adequate street lighting.

Before starting a campaign for increase in street lighting, it would be well to review the fixtures which have been developed and designed to provide better light distribution and eliminate glare. Also for special requirements the new light sources may prove adaptable. The great room for improvement lies as much in quality of illumination as in intensity. The new fixtures will do an improved and adequate job without exceeding moderate cost. In city use we may therefore seek to replace unshielded sources with proper fixtures. Trial installations may bring about popular demand for extension.

The approach to improved highway lighting is more difficult. A few short stretches have been equipped with modern units but the long distances to be lighted and perhaps the remoteness of some parts of these roads from source of current supply will render this a

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Grand Island, Neb., Safety Conference in Session

On Feb. 22, the eighth annual safety conference of the Nebraska Electric Association was held at Grand Island, Neb. The registration was two hundred and fifty, which was made up mostly of foremen in various operating departments.

This is an increase of almost 50 per cent over the attendance at any other of these safety meetings.

The event has become an institution in Nebraska, specializing on round table discussions, with foremen participating freely on various safety and first aid matters.

This year the conference attracted men from Iowa and Missouri. Also representatives of telephone companies, private construction companies, police and fire departments were present.—T. B.

COMMERCIAL COOKING SURVEY—1934

Each year since 1926, a survey of sales of electric commercial cooking equipment has been conducted in order that the trends in business might be indicated. W. H. Sammis, chairman of the Industrial Power & Heating Committee, appointed B. M. Riker, Rockland Light & Power Company, Nyack, N. Y., to undertake such a survey for 1934.

A subsantial number of companies returned information in answer to a questionnaire. Only those have been tabulated that were complete, and although the data presented herein are brief, the sales results of these twenty-seven electrical systems for commercial kitchen equipment will be found interesting and helpful.

1934 COMMERCIAL COOKING SURVEY

Co.	No. Comm'l Meters	Sales Policy	No. Salesmen Part Time	No. Salesmen Full Time	1934 Commercial Cooking Sales Kw	Kwhrs	Annual Revenue	Biggest Market—1934
1	39,000	Sells direct if necessary, but prefers to sell through dealers	..	1	300	300,000	$9,000	Pantry and Counter Equipment
2	11,222	Sells direct, also through dealers	All salesmen help 4 Also sell lighting and air conditioning		475	950,000	19,000	Heavy Duty Cooking Equipment
3	30,000	All sales made by dealers	3	..	332	265,600	13,280	Pantry and Counter Equipment
4	9,266	Sell direct	6	1	435	521,500	13,050	Pantry and Counter Equipment
5	8,315	Sell direct, also through dealers	..	2	1,020	1,500,000	25,600	Baking, 386 kw. Cooking, 337 kw.
6	69,000	Merchandising limited. Sales through kitchen equipment houses	5	..	780	1,560,000	31,200	Pantry and Counter Equipment
7	28,474	Sell through dealers	1	..	156	249,600	6,240	Pantry and Counter Equipment
8	9,712	Sell through dealers	1	..	453	228,340	4,566	Heavy Duty Cooking Equipment
9	52,222	Sell direct	12	..	1,300	1,950,000	52,000	Pantry and Counter Equipment
10	36,000	Sell through dealers	11	2	584	430,358	7,768	Pantry and Counter Equipment
11	7,994	Sell direct	1	..	250	465,000	10,000	Pantry and Counter Equipment
12	11,291	Sell direct	1	..	450	604,800	13,477	Heavy Duty Cooking Equipment
13	36,170	Sell through dealers	..	8	2,825	2,456,232	33,896	Pantry and Counter Equipment
14	33,000	Sell through dealers	4	1	850	1,872,000	37,440	Pantry and Counter Equipment
15	8,351	Sell direct, also through dealers	1	..	148	242,000	6,050	Pantry and Counter Equipment
16	....	Help dealer to sell	17	..	1,563	1,519,000	42,755	Pantry and Counter Equipment
17	*43,462	15 companies sell direct; 10 companies handle sales through dealers	..	6	1,073	1,647,519	33,460	Heavy Duty Cooking Equipment
18	50,000	Some sales direct; mostly through dealers	1	..	97	122,000	3,050	Pantry and Counter Equipment
19	75,000	Sell through dealers	All salesmen help	2	750	1,000.000	15,000	Pantry and Counter Equipment
20	19,487	Sell direct	..	3	785	814,227	22,174	Pantry and Counter Equipment
21	34,215	Sell direct	10	..	420	656,000	11,564	Pantry and Counter Equipment
22	9,812	Sell through dealers	14	3	1,016	1,300,800	27,500	Pantry and Counter Equipment
23	....	Sell through dealers	4	6	2,017	2,245,490	102,922	Pantry and Counter Equipment
24	23,100	Sell through dealers	..	1	404	421,000	11,000	Pantry and Counter Equipment
25	31,706	Sell direct, also through dealers	1	..	210	330,000	5,000	Heavy Duty Cooking Equipment
26	44,000	Sell through dealers	..	3	1,750	3,500,000	57,500	Pantry and Counter Equipment
27	20,736	Sell direct, also through dealers	All salesmen help 6	1	2,200	5,280,000	66,000	Heavy Duty Cooking Equipment

* Represents 28 operating companies.

Meter Installations

(*Continued from page* 82)

than this may be justified on the basis of general increased registration and the elimination of meter reading difficulties. Serious consideration is now being given a program of general rebuilding similar to that mentioned above.

Different methods are being used at present for this class of rebuilding work because of variations in meter installation practice and varying local rules and conditions. In most cases the meters formerly installed indoors are placed in enclosing boxes when moved to outdoor locations. The majority of the boxes being used are of the folded rustproof steel construction, although a considerable number of aluminum boxes are also being used. The steel box type of installation, in general, gives the lowest over-all first cost for the original installation, but these costs vary widely in different locations. With estimated and actual costs varying from approximately $5.50 to $15.00 it would seem that an additional expenditure for aluminum boxes or for rebuilding the old meters to the detachable type should not give a very large percentage increase in over-all cost and that such increased cost should be justifiable on the basis of lower maintenance or standardization in practice.

Effect of Street Lighting on Accidents

(*Continued from page* 87)

slower process of development. Perhaps here the correction at least for some years must be in wider, straighter highways and stricter enforcement of headlight laws. This, however, is a poor makeshift compared with adequate lighting.

Certain it is that the lighting companies have an opportunity to bring about corrective measures directed against the national disgrace of automobile killings. A vigorous educational presentation of the facts brought out in some of the studies listed below will be of real public service.

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3. "The Code of Street Lighting." Committee of Street Lighting. Illuminating Engineering Society. New York City.

4. "Relation of Highway Lighting to Highway Accidents." Arnold H. Vey, Traffic Engineer, State of New Jersey.

5. Examining Applicants for Drivers Licenses." National Safety Council.

Note: The first four articles are published in one volume of Transactions of the Illuminating Engineering Society for January, 1935.

Present Status and Future Development of the Rectifier

By A. M. Garrett

A paper presented at the February meeting of the Electrical Equipment Committee

THE mercury arc power rectifier, since its introduction in this country 10 years ago, has so increased in number as to be considered an established competitor in the conversion field with the synchronous converter and the motor generator. This is especially true in railway service, where it is equally applicable to large city traction systems, steam road electrification, or electric interurban railways.

The first rectifiers brought to the United States or produced in this country were accepted by the operating companies largely on an experimental basis with the idea that the rectifier would eventually equal the converter and the motor generator in performance and reliability, and have in addition those advantages naturally inherent to the rectifier. Briefly summarized the principal advantages are as follows:

1. The rectifier is primarily a static machine with no involved rotating element requiring periodic inspection, replacement and maintenance of wearable parts.
2. It is an ideal unit to use where noise must be taken into consideration.
3. It is well adapted for installation in places which are not suitable for a converter or motor generator, such as underground rooms or vaults.
4. A single rectifier unit is sufficient for any voltage requirement in the commercial field, whereas for service voltages above 750 volts, the rotating types, because of commutator limitations, require two units in series to produce the desired output voltage.
5. The rectifier has a better efficiency than the converter or motor generator, the degree of improvement being dependent upon the operating voltage and the nature of the load. A rectifier operating at 1500 volts with a highly fluctuating load, with long periods of light load, shows an efficiency noticeably higher than the converter or motor generator.

Since the earlier types many improvements have been incorporated in the rectifier. Some of these features are:

(a) The capacity of the unit has been increased until units of 5000 amperes and higher rating are now practicable.

(b) The addition of screens in front of the anodes has provided better control of the potential conditions in the arc stream and decreased the susceptibility of the unit to arc back when the current transfers from one anode to the other.

(c) Improved evacuating apparatus and better sealing of the bowl reduces the occasions of low vacuum and the presence of "remnant" gases.

(d) Improved arrangement of the cooling facilities has resulted in more uniform temperature conditions and reduced susceptibility to arc backs.

(e) The use of anode heads of carbon instead of steel permits higher arc temperatures on the anode surface without danger of distorting the material.

(f) The output voltage of a rectifier can now be regulated to give a flat voltage curve by means of a grid placed in the arc stream and energized at the proper instant to control the firing of the anode.

Future Developments

As indicated, the rectifier has made substantial progress in reliability and performance in the last 10 years and in many respects is now considered to be on an equality basis with rotating converters. There are, however, certain adverse conditions that still cling to it and furnish a handicap to its full acceptibility.

One of these conditions, which has been associated with the rectifier from its earliest use, has been the time required to overhaul the unit out of service for major repairs. Although the frequency of these major repairs has been reduced in the latest types, the element of time in making the repairs, from two to three days, has not decreased. As yet, there seems to be no way by which the time required to open the bowl, make repairs, reassemble the unit, pump down the vacuum, and reform the unit can be shortened. The last two operations, that of evacuating the unit and reforming, is an indefinite procedure and therefore requires the greatest amount of time.

In the future development of rectifiers the question of improvement in insulation should be considered. In a rectifier the insulation is subjected not only to electrostatic and mechanical stress but to high temperatures as well. In some instances operating experience has shown insulation to be the most unreliable material in a rectifier.

The "ripple" or undulations produced by the voltage wave in a rectifier may, by means of inductive effects, produce interference in parallel communication circuits. For the direct current side of the unit the use of a series reactor and resonant shunts have been found satisfactory for smoothing out the principal harmonics. However, where the A.C. supply lines to the rectifier may be overhead rather than underground and parallel to the communication line, the problem becomes more involved and more expensive to correct. Several installations are now being equipped with resonant filters on the A-C side to mitigate the disturbance. The extent of exposure to the communication line is also a decided factor in the problem.

A survey of a number of installations shows the installed cost of a rectifier is higher than that of a converter of corresponding size. Also the maintenance and repairs are equal to or greater than for the converter. Originally the development cost was some justification for a higher cost of a rectifier, but this does not seem to be warranted today, since the rectifier is on a much larger production basis in both number and size. In many instances the original installed cost was not the final investment, since the cost of subsequent improvements and added devices to increase the reliability of the rectifier had to be included. In theory the maintenance and repair cost of a rectifier should be much lower than for a converter. Up to the present time operating practice does not show such.

Considering the advances the mercury rectifier has made up to the present time, it does not seem consistent to believe that the remaining unfavorable features still characteristic of its present status indicate a limitation as to its future use, but rather that through further development these adverse conditions can be eliminated, and establish the rectifier as a universally accepted unit for conversion purposes.

Prime Movers Committee Meeting

Alfred Iddles, Chairman

THE winter meeting of the Prime Movers Committee was held Jan. 14-15 at Detroit, Mich. Practically all of the members of the committee attended, as well as a number of guests from the nearby power companies. Mr. J. N. Landis, of the Brooklyn Edison Company, 380 Pearl Street, Brooklyn, N. Y., was appointed Secretary of the Committee.

A progress report on Precipitation of Dust from Flue Gases had been prepared by Professor Christie, and was distributed to members of the committee. In the discussion of this report it was brought out that a number of the large cities are employing various methods for obtaining information on the solid content of the air over the cities. These results indicate a wide variation in the solid matter deposited in the different cities, and also a wide variation between the deposits in a residential area and a business area of the same city.

The question of using flue gases as a source of carbon dioxide for the manufacture of dry ice was reviewed. Several members who have investigated this subject have concluded that it is more economical for the dry ice manufacturer to generate his own carbon dioxide than to resort to the necessary special operating conditions and installation features necessary to secure the high CO_2 content of gases required for the dry ice manufacture. Dry ice has been successfully used in several cases to shrink members for assembly, either in place of or together with, the heating to expand the external members.

The Boiler Subcommittee presented an outline of the report which they are preparing. This report will be confined to subjects that are of real interest and value to member companies under the present circumstances.

Professor White presented a paper including lantern slides of curves and photographs on material for use with high temperature steam. He circulated copies of the following tentative A.S.T.M. specifications dealing with this type of material:

A106-34T—Tentative Specifications for Lap-Welded and Seamless Steel Pipe for High Temperature Service.

A155-34T—Tentative Specifications for Electric-Fusion-Welded Steel Pipe for High Temperature and High-Pressure Service.

A157-34T—Tenative Specifications for Alloy-Steel Castings for Valves, Flanges and Fittings for Service at Temperatures from 750 to 1100 F.

A158-34T—Tentative Specifications for Seamless Alloy-Steel Pipe for Service at Temperatures from 750 to 1100 F.

The Turbine Subcommittee had investigated the field within its scope and made the following recommendations:

1. Discontinue turbine outage data until newer units have had more service.
2. There is not sufficient material available to justify a printed report as many of the subjects suggested have been previously covered.
3. The subjects suggested should be discussed in Committee meeting and a resume of such discussion be incorporated as a part of the minutes.
4. Because of its importance to the industry it is suggested that a subcommittee be named to report at the next meeting on the subject of "rehabilitation of existing generating stations by utilizing superimposed capacity." It would be the purpose of this subcommittee to contact and obtain from the member companies such information as those companies may have available on the subject. It is believed that such a report, drawing conclusions from the information obtained from the member companies, would be a valuable contribution by the Prime Movers Committee. The report itself would be considered as a part of the Minutes of the Meeting and could be in mimeograph form.

The subcommittee on Oil and Gas Engines is preparing a report that will cover the same general subjects as covered in the 1933-1934 report. In addition, this report will deal with the newer high-speed engines.

Mr. Dillon reported that there has been a recent invasion of the waters of Boston harbor by a marine organism which eats the piling. Considerable trouble has been experienced in the harbor, and extensive pile replacements will be necessary. These organisms reproduce profusely, their action takes place rapidly when it starts, and they eat a pile near the mud line to a diameter about 2 in., and then move to other sites. Any information available on the suitability of concrete piling for northern waters would be very helpful in this situation.

An extensive round-table discussion of the difficulties encountered in the operation of steam generating systems and their associated equipment was held, and the members interchanged experience relating to the means they have developed for combating the various difficulties encountered.

The next meeting of the committee will be held at the William Penn Hotel in Pittsburgh on April 15 and 16. This meeting is being coordinated with the meetings of the other engineering committees.

Transmission and Distribution Committee Meeting

Mark Eldredge, Chairman

THE Transmission and Distribution Committee of the Edison Electric Institute held its sixth meeting at the Statler Hotel, Buffalo, Feb. 11-13, inclusive.

The forenoon session on Feb. 11 was in charge of Chairman Eldredge. Matters relating to plans for committee activities were discussed. Adjournment was taken in time to afford an opportunity for the various groups of the committee to meet separately and discuss plans for carrying on their respective assignments.

The afternoon session on Feb. 11 was in charge of the Standards and Specifications Group under the sponsorship of Mr. D. W. Roper of the Commonwealth Edison Company, Chicago. Due to Mr. Roper's absence, Mr. W. G. Kelley presided. Reports were given by project sponsors on timber products, transformer standards, hard drawn copper transmission cable, pole line hardware, fiber conduit and weatherproof wire.

The meeting on Feb. 12 was devoted to the presentation of the following technical papers relating to underground distribution; the session was in charge of Mr. C. T. Sinclair, sponsor of the Underground Distribution Group:

1—Alarm Relays for Use with Feeder Type and Balanced Pressure Type Oil Reservoirs—by E. D. Eby, Engineer, General Electric Company, Pittsfield, Mass.

2—The Development of a Low-Cost, Precast, Concrete Duct for Installation without Protective Envelope and a Precast Service

Box and Concrete Manhole Cover for Sidewalk Installations—by W. F. Davidson, Director of Research, Brooklyn Edison Company.

3—Corrosion of Subway Transformer Tanks—by P. H. Chase, Chief Engineer, Philadelphia Electric Company.

4—European Cable Practice—by W. A. Del Mar, Chief Engineer, Habirshaw Cable and Wire Corp.

5—Development of Secondary Network Cable—by G. B. Shanklin, General Electric Company.

6—Rebuilding Overhead Type Distribution Transformers for Underground Service—by P. H. Chase, Philadelphia Electric Company.

7—Rural Electric System Utilizing Coprsheath Cable—by F. L. Aime, Electrical Engineer, Anaconda Wire and Cable Company, Hastings-on-Hudson, N. Y.

The session on the forenoon of Feb. 13 was given over to overhead distribution problems and was in charge of Mr. Merrill DeMerit, sponsor of the Overhead Distribution Group. The following subjects were discussed:

1—A paper was presented by Mr. Eldredge that had been prepared by Mr. H. M. Clayton on Long Span Rural Lines.

2—Discussion on Bare Wire for Distribution Circuits—by Mark Eldredge, and Pole Strength Requirements and Embedment Determinations—by T. H. Haines.

3—Distribution Economics—by Merrill DeMerit.

4—Distribution Transformer Economic Design Factors—by A. C. Farmer, Westinghouse Electric & Manufacturing Company, with discussions by Mr. Howard Keath Wagner Electric Corp., J. B. Hodtum of the Allis-Chalmers Manufacturing Company and H. F. McRell of the General Electric Company.

The afternoon meeting of Feb. 13 was in charge of Mr. W. F. Davidson of the Brooklyn Edison Company, sponsor of the Plant Coordination problems of the Transmission and Distribution Committee. Discussions were given on joint use agreements and specifications by Messrs. W. F. Davidson, T. H. Haines and A. E. Silver. Mr. Haines outlined in considerable detail the status of the current revision of joint use construction specifications and discussed in general suggestions that had been made for use in preparing a specimen joint use agreement. Many phases of these questions were raised for discussion, and helpful suggestions were made with reference to the work that is being done jointly with the Bell Telephone System on joint use matters.

The attendance at this meeting was approximately one hundred, about half of this attendance being engineers from member companies.

The next meeting of the committee has been tentatively set for the week of April 15 at Pittsburgh.

Electrical Equipment Committee

W. F. Sims, Chairman

THE winter meeting of the Electrical Equipment Committee was held at the Netherland Plaza Hotel, Cincinnati, Ohio, on Feb. 18-19. Most of the members of the committee were present, and a number of guests attended the open meeting.

Apparatus and Design Division

Mr. Wilbraham presented a paper outlining a number of the more important applications of electronic devices in the industry. In addition to communication uses, the magazine *Electronics* in January, 1935, listed 327 types of tubes used. Of these 77.1 per cent were photoelectric, 14.1 per cent amplifiers, 3.1 per cent oscillators, 1.8 per cent rectifiers, 1.5 per cent grid-glow, .9 per cent cathode ray.

The committee discussed the application of electronic devices to direct current transmission. Most of the members present had witnessed the demonstration of direct current transmission at Schenectady in December, and had carefully reviewed the A.I.E.E. papers on high voltage d-c transmission. Considerable interest was expressed in this development, but it was felt that the misunderstanding, both by non-technical utility executives and by the general public, of the practicability of transmitting large blocks of power by direct current was unfortunate. A subcommittee was appointed to prepare a statement for publication pointing out the present status of this development and the engineering difficulties which must still be overcome before d-c transmission can be considered to have economic importance.

Mr. Conwell presented a moving picture film and paper prepared to show to substation operators and other utility employees methods of fire-fighting. This film has proved to be valuable in educating the employees, and Mr. Conwell agreed to make arrangements for other members of the committee to obtain copies of the film for use in their educational work.

Mr. Brown, chairman of the electric light and power representatives on the ASA Sectional Committee on Transformers, discussed the responsibilities of the electric light and power representatives on ASA Sectional Committees in relation to the Electrical Equipment Committee. In this work the various technical committees primarily act in an advisory capacity to the representatives on the Sectional Standardization Committees. The procedure to be followed in the development of an ASA standard insofar as the electric light and power representatives are concerned, is to prepare a first draft of the proposed standard, based on the best information available. After this is completed, the draft should be sent to members of the technical committees interested, and to other members of the industry who may have a particular interest in the subject. Following this review the representatives can feel confident that they have a thorough expression of opinion of the industry.

System Engineering Division

Mr. Dean presented a revised draft of the report which is being prepared on Principles and Practices in Grounding, which incorporates practically all of the comments received from the members of the committee on the first draft. This was thoroughly discussed and it was decided that it should be circulated to the members of the Electrical Equipment Committee, the Transmission and Distribution Committee and the Accident Prevention Committee for comments, to obtain as soon as possible a report suitable for publication, that would represent the combined opinion of the three committees interested in this subject.

Operation and Maintenance Division

Mr. Conwell presented a paper outlining the results of an investigation of painting by his company, conducted over the past several years. The company has prepared a performance specification and standard color charts for use in the purchase of paint. His experience indicates that a performance specification, carefully supervised, is the most satisfactory way of obtaining paint of good quality, uniform color and long life.

Messrs. George, Lanphier, Jones and Wallau read papers relating to pilot wire protection and supervisory control. The American Gas and Electric Company has made extensive use of carrier current pilot wire protection and obtained very satisfactory service from it. The Cleveland Electric Illuminating Company has been using leased communication circuits with satisfactory results

for pilot wire relaying of relatively short transmission circuits.

Utilization and Watthour Meter Division

The Meter Subcommittee has been working on the standardization of meter bases for the Type S meter. It was recently learned that one manufacturer has listed approximately 90 individual sockets for use with this meter, and that another manufacturer has listed already 24 different sockets. The subcommittee has carefully studied this problem, and has reached the conclusion that the following three types of sockets will supply most of the requirements for mounting of this meter:

1. Standard two-way at minimum price.
2. Standard two-way with back breakout at slightly higher price.
3. Special three-way with back breakout at a slightly higher price.

The committee approved the work of the subcommittee toward obtaining this simplification.

Mr. Hentz read a paper prepared by Mr. W. C. Wagner of the Philadelphia Electric Company showing various methods and types of installation of the Type A single phase meters.

Mr. Silver pointed out that, in order to obtain the maximum benefit from this standardization, it would be necessary for the individual companies needing special requirements to take the matter up with the Meter Subcommittee and not with an individual meter manufacturer, so that these problems could be considered along with other meter problems and worked out on a national basis instead of having many minor variations worked out for each individual application.

The Meter Subcommittee has made considerable progress in its work of the simplification of service entrance devices. The requirements outlined have been approved in principle by the N.E.M.A. Knife and Enclosed Switch Section, and it is expected that these requirements will be worked into final form in the near future.

The work of developing service entrance cables has been continued. At the present time there are three classes of cables in general use and one class with less general acceptance.

It appears now that there soon will be a cable available at a satisfactory price and acceptable to practically all inspectors for running complete from the pole directly to the meter. This not only provides additional protection against energy diversion, but also provides much simpler and more sightly construction.

Mr. Shuler reported that he had discussed with several representatives of the manufacturers of air conditioning equipment the problem of lamp flicker. The manufacturers of this equipment now recognize the necessity for keeping the speed of the equipment outside of the critical frequency range of flicker. When this is done the flicker problem from air conditioning equipment is no different from that of a similar size and type of motor applied to any other service where there is infrequent starting and stopping of the motor.

It is planned to hold the next meeting of the committee on April 16 and 17 at the William Penn Hotel in Pittsburgh, Pa.

Overvoltages on Transmission Lines Due to Ground Faults as Affected by Neutral Impedance

A Report of the Joint Subcommittee on Development and Research now Available for Distribution

THE relationship between overvoltages on transmission lines and the impedance through which the neutral is grounded has been a subject of discussion for a number of years. The possibility of such overvoltages has been one of the factors influencing the general use in this country of solidly grounded neutrals for extensive high voltage transmission systems. Reactors tuned to resonate with the system capacitance, such as the Petersen coil, have also been used for neutral grounding to limit the effect of overvoltages due to faults to ground. Although the possibility of such voltages were recognized, little or no data were available as to the magnitude of these voltages, their nature, or their relationship to the impedance of the neutral.

About four years ago one of the project committees of the Joint Subcommittee on Development and Research set out to secure field data on this subject. The study has consisted of both staged tests and operating records from overhead transmission systems. The data from operating systems included those with neutral isolated, solidly grounded, grounded through Petersen coils, and through resistors of 50 to 75 ohms, six systems in all. The results of this investigation are given in Engineering Report No. 30.*

At the time these studies began data from lightning investigations on transmission lines had indicated that overvoltages due to lightning or switching surges were independent of the method of grounding the neutral. The overvoltages considered in this report are, therefore, confined to what has been termed dynamic overvoltages. These are of longer duration than lightning and switching surges, and are dependent upon the method of grounding the neutral.

The observations on these systems consisted of automatic oscillograph records of overvoltage supplemented in most cases with surge recorder records. The shortest period of observation was nine months, and in most cases the data covered two years of observations. In addition to operating data from the six power systems the results of two series of stage tests are included.

In addition to studies of the magnitude distribution of overvoltages, the nature of the disturbance, as indicated by the wave shape, was studied. The fact that the majority of oscillograms showed that the voltage was essentially of sine wave shape suggested the use of symmetrical components to calculate their magnitude. The satisfactory comparison of observed voltages with those calculated by this method has justified the extension of the analysis to indicate the factors, other than the method of grounding, which affect the magnitude of overvoltage and its distribution over the system. Published data on other observations, particularly those of switching surges, are also reviewed.

*Price $.80 to members, $2.00 to non-members.

Missouri Association Convention in April

THE 29th annual State convention of the Missouri Association of Public Utilities will be held April 24-26, inclusive, at Kansas City, Mo., at the President Hotel. President Fred Karr, of St. Joseph, Mo., will preside at the business sessions.

Conference N.W.E.L.&P.A. Business Development Section

By Berkeley Snow

BUILDING load by merchandising on low terms over a long-time period was the principal point of discussion at the 10th Annual Conference of the Business Development Section of the Northwest Electric Light & Power Association at Vancouver, B. C., Feb. 21-22. The program, with Tom D. Fulford, Puget Sound Power & Light Company, chairman, emphasized 1934 experiences of member companies in various lines of business-building enterprise and thus was packed with useful fact and a minimum of theory.

The subject of low term, long period merchandising was introduced by W. T. Christy, Edison General Electric Appliance Company, Atlanta, Ga., who told of the 1934 load-building results of the Tennessee Power Company, Alabama Power Company and Georgia Power Company in line with the E.H.F.A. program in the Tennessee Valley. Mr. Christy attributed the success of these companies in substantially increasing average domestic use during 1934 to executive interest in the load-building programs and to the long-term offers on the purchase of appliances.

This low term, long period method of increasing saturation of heavy load-building devices will dominate the 1935 program of the Puget Sound Power & Light Company, as explained by F. E. Ross of that company.

In the consideration of promoting water heating load, three methods being successfully used in the Northwest territory were discussed. One company was selling equipment at cost; another company was maintaining list price on the equipment, but stressing the service features of automatically supplied hot water; the third company was merchandising the automatic water heater as a device. R. B. McElroy, The Washington Water Power Company, and Orr E. Crites, Portland General Electric Company, each explained the methods used by their respective companies in promoting this load.

In discussing methods for promoting refrigerator load, L. W. Brainard, Idaho Power Company, stated his own merchandising program was based on the premise that best results would be secured if the company remained active in the market, regulating the intensity of its activity according to the activity of and results secured by other dealers.

The subject of small appliance promotion was covered by J. A. Lockhart, Pacific Power & Light Company, who brought out the fact that this promotion had been effective in increasing the use of energy by the minimum customer, and that a continuous sales activity on lamp socket appliances was being carried on by his sales organization, even though the organization was set up to feature the heavy load building devices.

J. B. Buman, Northwestern Electric Company, told of his company's organization of a Home Lighting Department, pointing out the good points and weaknesses that had developed in the program during a year's trial.

How the home lighting service girls could make substantial increases in wattage in the course of their home surveys was vividly portrayed in a skit directed by Walter E. Potter, Incandescent Lamp Department, General Electric Company, and acted by Harriet Klumpp, Northwestern Electric Company, and Corliss Guy, Puget Sound Power & Light Company.

The possibilities in talking motion picture advertising were demonstrated by a showing of trailers by James Lightbody, B. C. Electric Railway Company, who pointed out the pitfalls to be avoided and explained how in the experience of his own company these trailers had been improved as time went on.

Two skits enlivened the program of the Domestic Sales Bureau, chairmanned by Glenn L. Jackson, The California-Oregon Power Company; one, a playlet entitled "The Big Night," portraying the sales points of an electric kitchen; and the other, "A Day with the Weeks Family," bringing out sales features of an automatic hot water system. These were both produced by actors and actresses drawn from the organization of the B. C. Electric Railway Company.

In the program of the Commercial and Industrial Sales Bureau conducted by O. C. Mayer, Idaho Power Company, vice-chairman, unfavorable competitive factors met with in developing commercial cooking load were discussed by A. K. Gaylord, Northwestern Electric Company.

The possibilities for increasing the commercial lighting load in the store modernization now taking place under the Federal Housing Act were graphically portrayed in a series of slides shown by L. B. Gawan, Utah Power & Light Company.

In the industrial power field, Thomas M. Gibbes, Puget Sound Power & Light Company, chairman, introduced the subject of how to obtain small and large industrial heating loads, touching on the types of rates needed to obtain these loads, and the electric melting of brass and iron, and a discussion of competition with the small high-speed Diesel engine.

H. C. Bender, The Washington Water Power Company, chairman, Air Conditioning Committee, told of accomplishments in this field during the past year, and Thomas J. Mellon, North Wesix Electric Company, Seattle, brought out the possibility of securing profitable electric heating business, stressing the auxiliary heating field, in connection with the promotion of air conditioning.

Under the title "Does Rural Electrification Pay?" J. C. Scott, Puget Sound Power & Light Company, brought out the economic value to the state of the intensive rural electrification program carried on over the past several years by his company. As an example, this electrification has changed the state of Washington from an egg-importing state to a large exporter, bringing millions of new revenue to the Washington farmers, and other similar examples were cited.

R. S. Overstreet, Idaho Power Company, discussed his company's farm electrification program by which 60 per cent of the farms in the territory served by the company are now electrified.

A feature of this Bureau program, chairmanned by C. J. Hurd, Mountain States Power Company, was the showing of a film, "Jim Stays on the Farm," produced in the territory of The California-Oregon Power Company and Mountain States Power Company by H. D. Kem of those companies.

W. G. Murrin, president, British Columbia Electric Railway Company, welcomed the delegates to Vancouver on the opening morning, and in his response thereto Leslie R. Coffin, Puget Sound Power & Light Company, and president of the Association, sounded the keynote of the meeting when he stated that the commercial men would have to sell the industry out of the depression. Arrangements for the meeting, which was held in the auditorium of the B. C. Electric Railway Company, were handled by W. C. Mainwaring, merchandise manager for that company.

INDUSTRIAL HEATING POINTERS

Hot Flashes!

Are you confining the application of soil heating cable to those customers who are propagating various kinds of flowers and plants, or are you taking advantage of this versatile heating element and putting it to work where low cost, low temperature, low watts density, flexibility, and ruggedness are required? Don't forget that it can be used for immersion in liquids, as well as wrapping around irregular objects. If you will just ponder for a few moments the enormous possibilities of soil heating cable, you will certainly become enthusiastic, and push its use.

* * *

Have you got your quota of automobile engine heaters installed this winter? Spend just three minutes sitting down and figuring out what these 125-watt heaters mean in the way of revenue and increased popularity of electric heat, and you will be surprised. How large do you think the market is?

* * *

Induction type heating units have stolen the show for the last few years, but don't forget your old friend the radiant type heater. Many perplexing jobs have been solved easily and cheaply with small reflector type radiant heaters.

* * *

When you get into an argument over competitive fuels, remember to keep heat out of the argument and put it on the job.

Color and Quality Control

The Ault & Wiborg Corporation of Cincinnati is a manufacturer of industrial finishes; paints, varnishes, lacquers. In the production of these finishes to its customers' exact requirements, it is necessary to exercise exact and constant control over color and quality. Samples are dried or baked under standard conditions to insure that all batches are alike. The various control laboratories have recently been equipped with electric ovens for this purpose.

Electric ovens were chosen because they offer accurate automatic temperature control and uniform temperature distribution throughout the oven. Electric heat eliminates the variable human factor and gives an accuracy that cannot be otherwise attained.

The ovens are built of sheet iron with rock wool insulation. The electric heating unit, a 2500-watt ribbon-wound oven heater, is located under the baking compartment. Circulation and ventilation are provided by a small blower on top. Automatic temperature control is by an adjustable and indicating thermostat with a range of 0 to 500 deg. F.

Electric service is furnished by the Union Gas & Electric Company.—*Contributed by Mr. Dewey, Union Gas & Electric Co., Cincinnati, Ohio.*

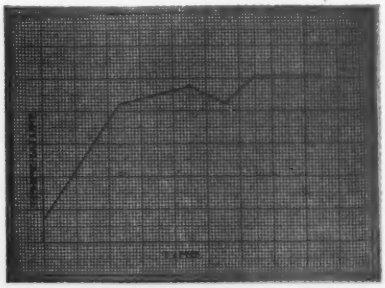
Complete Control for Industrial Ovens

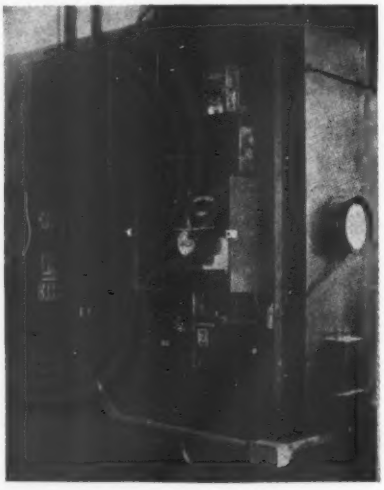
One of the most interesting features of modern industrial ovens is the ease with which the temperature can be varied and controlled. It is becoming increasingly common for the housewife to set the time clock and adjust the thermostat on her up-to-date insulated range oven in order to attain a predetermined temperature at a certain time and to maintain it for a given period. The same thing has been possible with industrial ovens for a long time.

Even greater flexibility has been required for some processes, however. One of the prominent domestic electric range manufacturers has realized it, with the result that it is now possible to automatically drop the temperature from one setting to another during the meat roasting period in order to obtain a more delectable product than was heretofore possible. If now we extend this modification to a point where it is possible to obtain any time-temperature cycle desired, we have the ultimate in control refinement.

Such control is available in industrial ovens. A cycle such as depicted in the accompanying graph can easily be obtained. Up or down, for a short period or long, once or a thousand times; it's a simple matter! For an existing oven the only limitations are that the required heating and cooling rates must not exceed the inherent ability of the oven to provide or dissipate heat.

The photograph shows such a control on the electric oven at the plant of one of our customers, the Bay State Abrasive Products Company of Westboro, Mass. The high-grade abrasive wheels have to be baked for a period of perhaps





two to three days, during which time the oven temperature has to follow closely the predetermined time-temperature curve for the particular type of material being processed. Imagine the expense and uncertainty of human attendance for such a purpose!

The control instrument itself appears in the exact center of the photograph. The standard sector-shaped thermostat is supplemented by a motor-driven clock upon the main shaft of which can be fastened a cam cut from sheet metal and having a contour which will give the time-temperature curve desired. This shaft rotates once in 24, 48, or 72 hours, as specified when ordered. As the cam revolves, an increase or decrease in its radial length causes a higher or lower thermostat setting respectively, to which the oven-heating medium responds accordingly.

If some other cycle is desired, simply put on the proper cam. If the cycle chosen does not give the exact result required, modify the cam contour. Almost like the lion tamer and his magic wand. Truly a wonderful tool for the oven user!—*Howard A. Hands, Boston Office, New England Power and Engineering Service Corporation.*

Steam Sterilizing for the Small Dairy Farmer

The Electric Farm Equipment Co., 414 Salem Street, Lynnfield, Mass., has

(*Continued on page 96*)

POWER SALES ITEMS

AIR CONDITIONING

"It's the Humidity," by R. B. Purdy. Power, February, 1935, p. 76. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

Second of a series of articles dealing with the engineering side of air conditioning. This article deals with humidity and its effect on air conditions.

"Air Conditioning In the Rockefeller Center Development," by A. W. Canney. Ice & Refrigeration, January, 1935, p. 15. Nickerson & Collins Co., Publishers, 435 N. Waller Avenue, Chicago, Ill. N. Y. Office, 520 Singer Building.

CONTROL EQUIPMENT

"Starts Group of Motors with Single Auto-Transformer," by Charles A. Armstrong. Power, February, 1935. p. 96. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

This article, with the attached diagram, shows how several closely grouped motors that are to be started consecutively from one location may be installed so as to be started through one starting transformer. This will be of interest to power engineers as in lots of cases control equipment can be installed in this manner and a reduction made in the cost of control equipment.

DIESEL ENGINES

"Ten Cylinder Radial Diesel Engine." Power, February, 1935, p. 102. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

The description of this engine under "What's New In Plant Equipment" describes a radial type, 635 HP, 1400 RPM, 10 cylinder Diesel which weighs 3900 lbs complete with accessories or about 6 lbs per HP. This engine has a net piston speed of about 900 fpm and a fuel consumption of about 0.45 lbs per brake horsepower-hour has been obtained using No. 4 furnace oil. This engine is manufactured by the Continental Motors Corporation and they offer the unit for constant duty industrial service. Power engineers will be interested in this engine as it is something new in the field of one of their greatest competitors.

"Editorial Views." Diesel Power, February, 1935, p. 75. Business Journals, Inc., Publishers, 192 Lexington Avenue, New York City.

Breakage insurance for Diesel engines is high. The editor feels that actuarial experiences probably justify the existing rates, but that these experiences may be the result of a faulty approach to the problem.

"Small Size No Detriment to Good Design." Diesel Power, February, 1935, p. 80. Business Journals, Inc., Publishers, 192 Lexington Avenue, New York City.

Description of a small engine generating plant installed in the West Branch Creamery, Milton, Pa.

"Low Operating Costs Characterize Diesel Power Units." Southern Power Journal, February, 1935, pp. 36-37. W. R. C. Smith Publishing Co., 1020 Grant Building, Atlanta, Georgia.

This article contains some cost records on Diesel engines used for deep well pumping for irrigating surfaces.

"An Oil Engine Explosion." Southern Power Journal, February, 1935, p. 37. W. R. C. Smith Publishing Co., 1020 Grant Building, Atlanta, Georgia.

This article describes briefly the supposed cause of the explosion and advises Diesel engineers not to "become melancholy or fearful."

ECONOMICS

"1934 Obsolescence Measures 1935 Opportunity." Power, January, 1935, p. 27. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

More details of the survey of 454 industrial plants as announced in the Mid-December issue.

ELECTRIC DRIVE

"2500 HP Auto-Synchronous Motor With Starting Load of 6250 HP," by J. D. Chisholm. Electrical News and Engineering, Jan. 1, 1935, p. 24. Hugh C. MacLean Publications, Ltd., 347 Adelaide Street, West, Toronto, Canada.

Large new drive installed in Ogilvie Flour Mills plant replaces several induction motor drives and reduces operating costs.

EQUIPMENT SALES

"Manufacturers Are Optimistic." Electrical World, January 5, 1935, p. 51. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

Electrical equipment manufacturers look forward to a 17½ per cent increase in business in 1935. Much of this equipment falls in the "load-builder" class.

ICE PLANTS

"Diesel Driven Ice Plants," by L. A. Ramsey. Diesel Power, February, 1935, p. 76. Business Journals, Inc., Publishers, 192 Lexington Avenue, New York City.

Ice making costs are high because of the poor yearly load factor of the average plant. Diesel engines, the author feels, should always be considered in design of plants in order to get the cheapest power service. Cost for fuel and lubricating oil in eight plants inspected shows average cost of .2856 per ton, averages based on summer conditions over very short period. Five methods of connecting Diesels to refrigerating compressor are also discussed.

INDUSTRIAL ELECTRIFICATION

"Power at Work in Industry." Electrical World, Feb. 16, 1935, p. 58. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

Five new applications which are of interest to industry:

1. Two flood lights replace twelve lamps.
2. Built-in motors and control.
3. Portable (dry) cement unloader saves investment.
4. Shoe drying racks save investment.
5. Post mount control saves space.

INDUSTRY

"Why Industry Hesitates," by Forney Johnston. Nation's Business, February, 1935, p. 25. U. S. Chamber of Commerce, Publishers, U. S. Chamber of Commerce Building, Washington, D. C.

A review of the impediments to industrial confidence and recovery together with an examination of some of the probable results if the government continues and expands its policy of reviving business by national ownership and operation.

POWER COSTS

"These Are Power Fallacies," by P. W. Swain, Editor. Power, January, 1935, p. 19. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

The Editor states his opinion on six fallacies in power plant operation and power cost.

POWER SALES

"Breaking Down Sales Resistance." Electrical World, Feb. 16, 1935, p. 68. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

A booklet entitled "Save by Modernizing Electrically" has been released by the Electrical League of the Niagara Frontier. Concise, crisp, illustrated messages emphasize the savings in production and operation through electric heat, electric drives, better light, etc. Such an approach insures a more cordial reception for the salesman and saves time in explaining their mission.

"Defensive Methods in Power Sales—Building up the Load." Electrical World, Feb. 2, 1935, p. 300. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

This article stresses the importance of defensive sales methods in maintaining existing business and securing additional business. These defensive sales methods consist of obtaining operating records of private plant installations and proving or disproving the savings claimed for their operation. The use of actual operating records to prove existence of maintenance, breakdown and interruptions of service, and the analyzing of engine-purchase contracts is also advised.

"Competition in Power Sales." Editorial, Electrical World, Jan. 19, 1935, p. 189. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

This editorial stresses the three-fold competition which the power salesman faces at the present time. The first is the lack of understanding and cooperation on the part of utility executives because of their absorption in domestic load building. Second is the currently popular feeling of "too high" electricity bills. The third competition is progress as represented in putting the power plant close to the load and checking the spread of transmission systems.

REFRIGERATING PLANTS

"Choosing the Drive for Refrigerating Plants," by Professor V. L. Maleev, Oklahoma A. & M. College. Diesel Power, February, 1935, p. 82. Business Journals, Inc., Publishers, 192 Lexington Avenue, New York City.

Domestic and commercial refrigerators have taken the margin of profit from cold storage and ice business. Operator must therefore find cheapest drive if he expects a profit. Author sets up Diesel case on basis of (1) about 20 years engine life, (2) fuel cost less than 5¢ gal, (3) labor costs same as electric, and payment out of savings in 6½ years.

STEAM PLANTS

"Steam Plants," by R. B. Purdy, Associate Editor. Power, January, 1935, p. 2. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

A review of steam generating stations, central, municipal and industrial, installed or under construction in 1934. Table includes all pertinent data.

"Firestone Goes to 1400 Lb. at Akron," by W. K. Adkins, Power Engineer, Firestone Tire & Rubber Company. Power, February, 1935, p. 59. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

Firestone will soon complete installation of a 1400 lb. boiler and 10,000 kw back pressure turbine exhausting to evaporators. Major details of the new installation are given.

TRANSFORMERS

"Permissible Overloads for Transformers." Power, February, 1935, p. 98. McGraw-Hill Publishing Co., Inc., 330 West 42nd Street, New York City.

This article deals primarily with temperature limits and permissible short time overloads of power transformers. The large reduction in the life of a transformer when being operated overloaded is shown in a chart in this article and power engineers will be interested in this as often they are confronted with the problem of aiding customers in making their own transformer installations.

Steam Sterilization

(*Continued from page* 94)

developed an inexpensive steam dairy sterilizer for effectively sterilizing milk pails. The 1 kw size sells for $18.50, and the 2 kw size for $27. A description of this equipment, with photograph, is given in *Electrical World* for Oct. 27, 1934, page 56.

In use the sterilizer is plugged into the electric outlet just before milking time. The milk pail, inverted over the steam jet, is sterilized in three minutes after steam begins to flow. Steam starts three minutes after electricity is turned on. At a slight increase in price a storage tank for hot water may be included.

Dairy utensil sterilization is not a fad or an unnecessary refinement. Low bacteria count milk, together with high butter fat content, brings a higher price in the milk market. Tests have shown that where milking pails are washed but not sterilized, the bacteria in these pails will reach amazing proportions. In one recent test a count of 6,800,000 was found on a pail that had been washed only a few hours earlier. While all steps in the handling of milk contribute their part to bacteria contamination, no single one should be overlooked if a low total count is desired.

At the present time milk distributors pay an average of $2.20 per 100 lb. for 3.5 per cent butter fat content milk delivered at their plants. A premium of from 4 cents up per hundred pounds for each 0.1 per cent increase in butter fat is allowed. The excess over the 4 cents base is determined by the general quality, including bacteria count, of the milk. It is, therefore, of real monetary value to the dairy farmer to keep the bacteria count of his raw milk as low as possible.

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CONVENTIONS AND MEETINGS

MARCH

12-13 Oklahoma Utilities Association, Biltmore Hotel, Oklahoma City, Okla.

APRIL

15-16 Prime Movers Committee, William Penn Hotel, Pittsburgh, Pa.
15-16 Hydraulic Power Committee, William Penn Hotel, Pittsburgh, Pa.
16-17 Electrical Equipment Committee, William Penn Hotel, Pittsburgh, Pa.
18 Accident Prevention Committee, William Penn Hotel, Pittsburgh, Pa.
18-19 Transmission and Distribution Committee, William Penn Hotel, Pittsburgh, Pa.
18-19 Southeastern Electric Exchange, Forest Hills Hotel, Augusta, Ga.
24-26 Missouri Association of Public Utilities, President Hotel, Kansas City, Mo.
29-30 Chamber of Commerce of the U. S. A., Washington, D. C.

MAY

1-2 Chamber of Commerce of the U. S. A., Washington, D. C.

JUNE

3-6 EDISON ELECTRIC INSTITUTE, Mayflower Hotel, Washington, D. C.
17-18 Accounting and Business Practice Section, Northwest Electric Light and Power Association, Portland, Ore.
19-21 The American Society of Mechanical Engineers, Hotel Gibson, Cincinnati, Ohio.
24-28 American Institute of Electrical Engineers, summer convention, Ithaca, N. Y.
26-28 Canadian Electric Association, Algonquin Hotel, St. Andrews-by-the-Sea, N. B.

OCTOBER

14-18 National Safety Council, Louisville, Ky.

Periodical

In Two Sections—Section 2

EDISON ELECTRIC INSTITUTE BULLETIN

MARCH, 1935

Statement Regarding the Public Utilities

Made March 14, 1935, at Washington, D. C., before the Interstate and Foreign Commerce Committee of the House of Representatives in the course of the Hearings on the Rayburn Bill (Public Utility Act of 1935—H.R. 5423)

By Wendell L. Willkie

President, The Commonwealth & Southern Corporation

IN expressing my appreciation for this opportunity of being heard by this Committee on Interstate and Foreign Commerce, I do not want it to be a mere perfunctory expression. Every week for the last two years, regularly and usually several times during each week, there has emanated from this city drastic and defamatory statements concerning public utilities and public utility holding companies—a business with which I have been connected since I left college. I have, during this two-year period, regularly and persistently gone from department to department of the Federal Government, begging for a hearing and, although I have been treated most courteously, I have been advised by each department visited that they were without jurisdiction to hear my cause.

I can readily understand how you men without the time or the available sources of information to know the facts may have acquired preconceived notions and prejudices. That is only the natural consequence of this continued flow of publicity, generalizing from isolated instances and containing the most unfair imputations against many responsible and reliable business organizations which have been and are now performing an efficient service to the people of this country. With due respect to many men in public life, I believe they have accepted this propaganda without taking occasion to inquire personally into the facts.

I want to take upon myself and my fellow utility executives, the responsibility for this situation. We have stood by in the belief that the truth would eventually prevail and have left the attacks unanswered. There has also been a prevalent belief among executives of the larger American corporations, particularly those with offices fortunately or unfortunately located in New York City, that if one met such attacks, punitive measures would be visited upon him or the company which he represents.

Some year and a half ago, I disregarded this prevalent feeling and, because of the fact that the Tennessee Valley Development vitally affects the properties in the Commonwealth & Southern System, I took a public position on that question as well as on the attacks that were being made upon the utility business.

A short time thereafter, perhaps accidentally and entirely by coincidence, under Washington date line, scare headlines began to appear across the front pages of all the leading newspapers of the country in the following dulcet terms—"MUSCLE SHOALS POWER STOLEN"—"Preliminary inquiry has just scratched surface of rottenness linking private utility concerns"—"Scandal greater than Teapot Dome unearthed." The news commentators over the radio likewise spread the charge. For this I am not criticizing the newspapers or news commentators because statements made by public officials are news, irresponsible though such statements may be.

I at once wired the proper public officials in Washington, asking that the investigators be instructed to proceed at once and make such investigation public, thorough and complete, in order that the officials of the companies might be able to show at the earliest possible time the recklessly false and untrue nature of the charges quoted in the newspapers.

If those charges were true, I was the thief, for mine is the position of final decision. You can well imagine how I would feel under such a charge with the accompanying grief and indignation that it brought to my associates and family—for although I am a holding company official living in New York City with an office close to Wall Street and a member of the imaginary power trust, I am still human and I hope at least decently sensitive. I wanted a public and immediate hearing. Such public hearing was not granted, but Mr. Huston Thompson, a well known opponent of the public utility industry, was placed in charge of the investigation. I heard from time to time that he was making an investigation, but neither I nor any of my associates were even asked or permitted to testify or furnish information. Nine months later, buried on the 16th page of the same newspaper which carried the previous charges in the most lurid form, I found an article stating that the charges had petered out and had been found to be baseless.

I know that I and the interest I represent will be punished for the statement I am now making. But when they recommended our death, they momentarily lost their power to hurt. Their only weapon has been calumny and it

is a lash already spent upon the backs of those they seek to doom.

I can readily understand how you men, from the publicity which has been almost continuous, may think very ill of us and our business. I make but two requests of you—first, that you disabuse your minds of any preconceptions and listen, free of prejudice, to other utility executives and myself; and secondly, that, as far as I am concerned, that after I have concluded my statement and before I leave this witness stand you will ask me any question that you may consider pertinent to this proposed bill concerning the Commonwealth and Southern Corporation. I shall answer frankly so far as I may have the facts at hand and if any of your questions require research, I shall be glad to file written answers with you, if such occasion arises.

Judge Healy, for whose ability as a prosecutor with a fine sense for news values I have high respect, has told you that the evidence presented by the Fedederal Trade Commission should have double weight because it was obtained from the books of the companies; that the companies were given an opportunity to examine the same and, if they found the facts incorrectly stated, to offer evidence in refutation. Judge Healy is correct about that, but no utility company had the opportunity to pass upon or know about the innuendoes, insinuations and misrepresentations contained in the press releases and statements of conclusion by which the attempt is being made to create a "favorable press" for the passage of the pending bill and to prejudice our cause in advance of its presentation. Let me be specific—

Some weeks ago there was released to the newspapers of the country, a statement that the utility holding companies and their officers were guilty of Federal tax evasion and their conduct in regard to this and other matters in a later release was described in the following gentle language:

"Nevertheless the use of words such as fraud, deceit, misrepresentation, dishonesty, breach of trust and oppression are the only suitable terms to apply if one seeks to form an ethical judgment on many practices which have taken sums beyond calculation from the rate paying and investing public."

It is needless for me to say to you men that if any of us public utility holding company executives had been guilty of Federal tax evasion, we would today be in a more confining place than this hearing room. You also know full well, that, if we had been guilty of fraud and deceit, dishonesty, misrepresentation and breach of trust we would be answering in the civil as well as the criminal courts for our conduct.

Some several months ago investigators for the Federal Trade Commission spent several weeks in our office in New York, making an elaborate investigation of our records and method of conducting our business. While there, one of these investigators came to me personally about a matter. In the course of the conversation he said to me: "Mr. Willkie, I want to congratulate you on the openness and the frankness with which your organization is giving us information. I also want to congratulate you on the way that you conduct your business; the elimination of your intermediate holding companies was splendid; the methods of your supervision and your interest in (and constructive help given) your operating companies are matters for commendation." I thanked him and said to him: "Why don't you put that in your report?" His reply to me was, "Oh, Mr. Willkie, I would be severely criticized if I put anything in my report favorable to a utility holding company."

Doctor Splawn also spent considerable time in our offices. He likewise expressed praise for our methods of doing business, particularly our service arrangement and absence of intermediate holding companies, and yet I find in his testimony here this same desire to make a case. Let me quote from Dr. Splawn's testimony of last week:

"They (referring to The Commonwealth & Southern Corporation) also, *about the time you began your inquiries,* made an arrangement so far as services were concerned and by which the operating companies would get this service at cost. I understand the operating companies own the service company. (Profits and the dividends were distributed back to the operating companies) * * *"

In other words, Dr. Splawn makes the inference that when we learned that your committee was going to make an investigation, we got what Judge Healy calls "religion" and revamped our methods of doing business.

Now the facts are, which Dr. Splawn well knows, that the so-called Rayburn Resolution was passed on Jan. 19, 1932, while we put into effect our present supervision arrangement two years before, on April 1, 1930. Dr. Splawn also testified as follows:

"Then there came a time as there does in the development of an industry when these inventions ceased to be so revolutionary as savers of operating expenses. Ten or fifteen years ago it appeared that the industry was becoming rather stabilized * * * Then there came a situation in which the financiers, namely the holding companies, for the first time eclipsed the inventors, the engineers, and those who had developed the industry. * * * "

Late in his testimony he also tells you that the holding company is of recent origin and presents a new problem. The facts are that as early as 20 years ago 76 per cent of the electric utility industry in the United States was controlled by holding companies. Most of the major utility holding companies existent today are the successors of companies which have been in existence for 25 to 50 years. Dr. Splawn gives you an idyllic picture of the lonely inventor who conceived and of the local entrepreneur and operator who built and managed the local power plant which was later gobbled up by the villainous holding company in the control of selfish, ambitious and greedy men, all to the great disadvantage of the inventor and the public.

There are some other authorities at least equally eminent who disagree with Dr. Splawn, one of whom wrote on Nov. 5, 1926, to one of my predecessors as follows:

ROOSEVELT & O'CONNOR
120 Broadway
New York
at Warm Springs, Georgia
November 5, 1926.

MR. THOMAS W. MARTIN,
Alabama Power Company,
Birmingham, Alabama.
My dear Mr. Martin:

I am writing this to you in order to obtain information. As you have probably read in the papers, I have recently taken over the old resort known as Warm Springs and hope that soon there will be an extensive development. *We, in this and the neighboring communities, are suffering from the usual high cost and inefficient service of small local power plants.*

* * *

Recently a new high tension power line has been put through within 6 or 8 miles of this place and running to Thomaston, Georgia.

Discussion has taken place in regard to the supply of power and light to Manchester, Warm Springs, Greenville and Woodbury, Georgia, from this line, but it is impossible in this vicinity to find out the exact facts. If, therefore, you would be good enough to send me a line to tell me what the situation is and whether the new line is one of your subsidiaries, I would be very grateful. It seems probable, of course, that the consumption of light power at Warm Springs will materially increase in the future.

Very sincerely yours,
(Signed) FRANKLIN D. ROOSEVELT.

and Mr. David Lilienthal when he was a public utility commissioner and before he became a competitor of ours operat-

ing his own holding company at public expense, had this to say:

"Since the pioneer public utility acts of New York and Wisconsin were enacted two decades ago, a new figure, the holding and management company, has come upon the field, demonstrated its prowess, and in a relatively few years changed the entire economic nature of the public utility industry. Isolated plants have given away to great systems whose lines span several states and serve hundreds of communities, all operated under unified managerial and financial supervision. The spread of rural electrification, the amazing advances in telephony, the rise of superpower systems—these and many other technological developments so intimately related to the public welfare are directly attributable to the efforts of the holding company. Perhaps most important of all, to the holding company must go the credit for the unprecedented flow of capital into the public utility industry making possible extensions and improvements of service. Every phase of public utility operation—financing, accounting, engineering, management, public relations—have undergone great changes under the new regime."

Also let me quote to you from another very critical student of the industry and of the utility holding company, Dr. Bonbright, one whom President Roosevelt, when governor, appointed to the New York Power Authority. Dr. Bonbright, in his book, "The Holding Company," has the following to say:

"The holding company has now become such an essential part of the structure of large-scale business that its abolition would be serious, if not fatal, to the effectiveness of American industry.

"Moreover, the mere fact, if it be a fact, that a given economic institution—such as the holding company, or the investment trust, or the protective tariff, or modern capitalism as a whole—has resulted, down to date, in more harm than good does not justify the conclustion that the institution should be abolished. Many of the evils to which it has given rise may be due to its misuse rather than to its inherent nature. The task of the legislatures, the courts, and the economists, in dealing with the holding company, is to understand and minimize the abuses to which it is subject, while recognizing and strengthening its social usefulness."

Let me now give what the president of one of the leading life insurance companies of the country recently wrote on this subject. I quote the pertinent part:

"As the President of a life insurance company I am trustee for more than three hundred and fifty thousand holders of policies averaging $3,500 each.

"Our Company has invested $50,000,000 in first mortgage bonds of about one hundred strong utility operating companies. Not a single bond is in default as to interest. We feel that the safety of our investments is strongly buttressed by the ample equities evidenced by holding company securities including debentures, and preferred and common shares standing between us and the default of our bonds. Each policyholder is, therefore, indirectly interested in the continued existence of the holding company as a financial safeguard.

"After thirty years' study of the subject from various angles, I am convinced that holding companies operate for the benefit of the public as well as the bondholder and perform a useful and desirable function in the gas and electric industry.

"The holding company unites under its expert management operating companies in diverse locations—constructing plants, standardizing methods, nursing small and struggling beginners, developing their usefulness and scope, and furnishing to the people in the smaller towns a service that is not otherwise practicable at rates made possible only by the existing profitable operations in the larger communities of the system. The holding company finances at a reasonable cost the needs of the small and struggling operating company during the period in which consumers are being educated to utilize the varied functions of electricity and gas. These many uses are being daily increased as a result of American inventive genius.

"The expansion of utility operations into large units is not the result of a desire for bigness alone. The operating company's volume grows constantly, and management must have the vision to plan accurately years ahead in order to construct the equipment necessary to keep pace with the increasing demand for service. To find the fixed capital for such expansion is one of the major tasks of holding company management. Also the production and distribution of electricity must be planned and performed on a large scale to render the most economical and satisfactory service.

"The interchange of surplus energy to meet requirements of other operating companies as demand and supply fluctuate is best arranged by large holding companies, and they also build up a varied load, which results in decreased costs to consumer.

"All these factors have combined to create with amazing rapidity one of the largest industries in the world with notable benefits to the people of the United States.

"The great army of honest and sound utilities who serve the public devotedly and satisfactorily should not be penalized for the misdeeds of others for which they are not responsible."

The true history is as President Roosevelt's experience so well illustrated, inefficient service and high rates prior to the coming of the holding company with its coordinating, combining, supervising and financing of the local power plants, and of the service rendered by electric utilities. You all remember the days of flickering and blinking lights and outages with every minor storm and change of weather with 15 and 20 cents per kwhr rates—the idyllic days so feelingly described by Dr. Splawn.

The domestic rates of the operating companies in the Commonwealth and Southern system are 17.76 per cent lower than the average domestic rates in the country, and are lower, taking into account taxes, than the domestic rates of the nation's municipal plants and in each state in which we operate are substantially lower than the independent plants in such states.

Such rates are likewise lower than the rates of the ideal situations mentioned by Dr. Splawn. As a matter of fact, if our companies had gotten the same rate in 1934 which his ideal situation received, our net would have been $20,000,000 more than it was.

Franklin D. Roosevelt named it—"We in this and the neighboring communities are suffering from the usual high cost and inefficient service of small local power plants."

A utility system exists for one purpose, namely, to render good service at reasonable rates. I believe I have shown you that we have done our part in lowering rates. In the long travail of investigation through which we have gone, no person or commission has raised a single question concerning the quality of the service. The great interconnected generation, transmission and distribution systems existing in this country today which are the admiration of electrical engineers throughout the world which make this quality of service possible, are universally admitted to be due to the utility holding company.

But Dr. Splawn would also create the inference in your mind that stocks of holding companies are by nature so speculative and so volatile in their market price fluctuation, that they create a menace to the security markets of the country; while stocks of local companies never cause inflation. It is true that our stocks under the constant drum fire of criticism have, during the last two years, shrunk greatly in market value. The common stock of the Commonwealth & Southern Corporation in 1929 sold for 42 times its earnings. Obviously a crazy price. But at the same time the stock of the independent company sold for 55 times its earnings. Understand also, since the common stock of the independent company represented the entire property, the multiple of inflation was, therefore, much greater. In other words, the market price reached a point where it was six times the book value, while in the most dizzy period of speculation the combined market price of the securities of the Commonwealth & Southern system were only twice its book value.

Since Jan. 1, 1933, more than three and a half billions of dollars in utility security market values has disappeared

while other stocks have risen in market value.

Indeed, the very consideration of a bill such as the one we are now discussing brings the ghost of fear and distress to the homes of five millions of American citizens who have invested in these securities.

I know it is being said that the dissolution of the holding companies will work no loss upon their security holders because such security holders will receive their proportionate distribution of operating company securities owned by the holding companies. The greater percentage of holding companies have outstanding debenture or other debts which must be paid upon dissolution prior to any distribution to the preferred stockholders who, in turn, except in the case of bankruptcy, must be paid in full prior to any distribution to the common stockholders.

Cash for the payment of the debenture holders could only be realized by forced sale of securities in a market which will be bereft of buyers by reason of the destruction of other holding company units and the prohibition of the bill against any aggregation of capital acquiring such securities.

For the sake of discussion, however, let us assume the correctness of the statement that the securities of operating companies owned by holding companies can be distributed among the holding company security holders, even though it has no basis in either law or fact. Under the provisions of this bill, which I shall later discuss with you more in detail, which places regulation upon operating companies' securities will be petitive governmental and municipal plants are wholly freed, the value of the operating companies' securities will be further greatly depreciated.

In addition, the operating companies will lose the benefit of centralized, continuous ownership, financing and supervision, which is recognized as an exceedingly valuable asset by every substantial buyer of utility operating company senior securities.

Some of you may differ with the economic philosophy of the *Wall Street Journal* but I doubt if any of you will question its knowledge of market operations. In its March 12 issue it had the following to say:

"The enactment of the Rayburn Bill in its present form certainly and only less surely in any muddling modification would mean the financial slaughter of some hundreds of thousands of small investors to make a speculator's holiday. A forced liquidation of existing holding companies within specific time limits whether by distribution of their assets in kind or by prior conversion into cash, would create a market situation ideally suited to the purposes of inside operators and professional speculators, the very class of persons against whom Congress exerted itself so heroically in the Securities Act and Stock Exchange Control Act to protect the average investor. No one who remembers the aftermath of the Standard Oil decision of the Supreme Court in 1911 will believe that any amount of vigilance on the part of SEC would suffice to assure the little fellow a Chinaman's chance in a general breakup of the existing utility systems."

The investing American family is now faced with this legislation, predicated on the arbitrary and false assumption that the utility holding company—whatever may be its present status or its past record—exists for no other purpose than to mulct the public. Remember that practically all of the things complained of happened before the market break of 1929, and were equally prevalent in all lines of business including agriculture.

Before passing from this subject, let there be no mistake but that such losses have had and are now having a depressing effect on the business and trade of this country which the President and Congress are attempting by every possible method to revitalize and restore.

It requires no penetrating study into the science of cause and effect to see that the loss of billions in market value already suffered results in hesitant buying and stagnation of the capital markets.

When a commission, an individual or a conference group—whether they be private individuals or vested with the larger responsibilities of government—follow a course of conduct which will depreciate other people's property and impair values which they did not create, it occurs to me they should be deeply assured in their own conscience that they are working toward the eventual advantage of those they have so injured and that they are giving extraordinary and acutely required benefits to many others as well. It should be obvious to everyone that as long as it is pending in Congress it is depressing values, depleting family savings, restraining industry and lessening employment through curtailing the purchase by consumers of manufactured goods whether it is intentional or not.

For the last two years practically every responsible man in the utility business in the United States has had to devote his best talents and energies to meeting this flood of political criticism. His primary thoughts have had to be to save his property. He has had little opportunity to think of expanding and developing business.

If we knew tomorrow morning that the questions involved in this bill could be equitably disposed of, we could authorize the doubling of our capital expenditures and put thousands of men to work. We could then again attract capital, build properties, enlarge our business activities and contribute greatly to the restoration of prosperity in this country.

If the millions of utility security holders knew that their investments were not to be liquidated, if they saw a rising instead of a declining price in utility securities, they likewise would be heartened to expend money. All that we utility men have been doing for the last two years is putting out fires. Please give us a chance to unleash our organizations for constructive purposes.

No industry can contribute so much to bringing this country out of the depression if it is given a chance. Yet this very legislation which you gentlemen are now considering which proposes vast changes that ramify our whole economic system is, in and of itself, an almost unsurmountable obstacle to our contributing to reemployment and business restoration.

I have for the last two years, in public address and in private conference with government officials, advocated additional regulation which would not interfere with the regulatory powers of the states for the correction of any abuses of holding companies and the prevention of their recurrence, which are not already taken care of by recent Federal legislation.

Likewise, it is very discouraging to contemplate the regulation by the government when it is one of our competitors and specifically exempts itself, under the provision of this bill, from the regulation to which it subjects its competitor.

Now I want to tell you about The Commonwealth & Southern Corporation. It was organized in 1929 as successor to three other holding companies, namely, Commonwealth Power Corporation, Southeastern Power & Light Company and Penn-Ohio Edison Company. The story of The Commonwealth & Southern Corporation, is to me, a fine American romance. The kind of a business romance that has made this country great.

In 1886 a grist mill owner and operator at Adrian, Mich., had just com-

pleted the installation of a new electric machine and was supplying current for a local street lighting system. The miller, W. A. Foote, later destined to be a pioneer in the development of water power in the state, was observing the feeble efforts being made to establish similar street light systems in Jackson, Albion, Battle Creek and Kalamazoo. He sensed the possibilities of using as a source of power supply the undeveloped sites on the Kalamazoo River.

While this work was being carried on and along about 1904 and 1905 some interests in Grand Rapids and Muskegon appealed to Mr. Foote to become associated with them in the development of the Muskegon River at Croton and Rogers. Similar developments, led by Anton G. Hodenpyl of Grand Rapids, were taking place at Bay City, Saginaw, Flint and other places in the lower peninsula of Michigan. None of the utilities were physically or financially equipped to undertake the job to build adequate transmission lines to tie these systems together or to avail themselves of the water power plants on the Au-Sable, Manistee and other rivers and bring the properties together into an integrated system. Consequently, in 1910 a holding company was organized by the owner of these properties for that purpose. The people in Michigan were either unwilling or unable to invest the necessary money for this development. Mr. Hodenpyl, therefore, moved to the money market of the country, namely, New York, and in the years following sent millions after millions raised in New York and Chicago back to Michigan to help develop that state.

About the same time, Mr. W. P. Lay, of Gadsden, Alabama, dreamed of possibilities of developing hydroelectric energy on the streams of Alabama. Let me tell you his story as it was written by his son in a recent letter to the President of the United States:

"My father believed that navigation on the Coosa River in Alabama could be made without cost to the Federal Government if private capital could be interested in the possibilities of the generation and distribution of power by the construction of high lift dams. With such idea, he approached the War Department and the Congress to find both agreeable to such plan.

"In due time a permit was given him for the construction of Lock No. 12 on the Coosa River under a solemn agreement that the private capital making such construction might have any power possibilities resulting in payment for the navigation benefits accruing to the Federal Government.

"My father incorporated a holding company for this and other power sites, the Alabama Power Company in Gadsden, and then began his heart-breaking effort to find capital with enough of the spirit of the pioneer to venture into the undertaking. He searched high and low, day and night, spending what he had accumulated and then depending on my mother to supply him with funds with which to carry on. For years he traveled from one lost hope to another, until finally, his money all gone and broken in health, he was close to, not surrender, but to defeat. At this, the eleventh hour, he by chance came in contact with the representative of some great bankers of London, England, and they through this representative finally agreed to the financing of the Alabama Power Company. Later, money was secured in New York.

"With the exception of a very few, no one in the state of Alabama would risk the investment of a single dollar in this company, they forecast certain failure for the venture and pronounced my father a visionary crank.

"After a struggle of several years the Alabama Power Company began the slow steady climb to success by the extension and improvement of its service. In the last 10 years it has, in my opinion, brought more industry to the State, expended more money in taxable investments, added more of the comforts of life to the citizenship than any other business factor in our boundaries.

"The Alabama Power Company became a unit of the Southeastern Power and Light Company (created as a holding company to integrate a great transmission system in Alabama, Georgia, Tennessee, Mississippi and South Carolina) and the Southeastern Power and Light Company for diversification of investment later was merged in The Commonwealth & Southern Corporation.

"Through all these years my father had held to most of the stock he originally acquired, retaining the faith he had in the efforts of his life of working days and sleepless nights. He has five sons for whom he had hoped to provide enough that they might escape some of the hardships which had been his, and with this end in view passed into their hands several years ago an equal division of his stockholdings, but requested each son to retain the stock and enjoy the benefits of his hard labors through the success of the company.

"At 82 years of age, having spent most of the last four years in bed and plainly seeing the end close at hand, he finds his Government the great destroyer of his life's work; the repudiators of a contract made in good faith with the Government of the United States, and he sees the same citizenship which refused to venture one dollar in an undertaking for the upbuilding of the State, now clamoring to steal the property under the guise of it being a bounty to the people directly from the Almighty.

"With the stock of Commonwealth & Southern reduced to the value of waste paper through the acts and threats of Government, is it a wonder that this man suffers from disappointment at the lack of honesty and good faith on the part of a Government that should exemplify those virtues to its people?"

The Chattanooga *Times* recently in an editorial, described the development in Tennessee. Let me quote from its Feb. 22, 1935, issue:

"In 1904 a Chattanooga engineer by the name of J. C. Guild and his associates began to think of the tremendous possibilities for converting the Tennessee River into something useful, useful to themselves and to all of the people of the Tennessee Valley. They were men of vision, they were men of courage, they were willing to risk their money in a great enterprise which seemed to offer hope of success. And it was *their* money they were willing to risk—not public money gathered from the burdened taxpayers of the country. They believed that the Constitution of the United States would forever protect them against confiscation of their investment and against confiscation of their profits, if any. The do-nothings of the day tried to discourage Mr. Guild and his associates. The timid souls of the day argued with them that 'it can't be done.' No one, in all the untold centuries that the Tennessee River had been winding its way to the sea, had been able to build a great dam across the river. No one had even tried to. The river was too big, too treacherous. 'Even if you should succeed in building your dam, it wouldn't hold water,' Mr. Guild was told. 'The river bottom is full of holes. The river runs over great caves, connected by subterranean passages. The water will run under the dam.'"

But Mr. Guild believed that it could be done. However, it took money to build a great hydroelectric dam. Lots of money. Three million dollars, the engineers said. Mr. Guild was a man of moderate means. His plan was not attractive to most local investors. It was too risky. It seemed impossible to raise the money for the great plan in Chattanooga.

But Mr. Guild would not forget his vision of an electrified Tennessee Valley. He was persistent. He got the Chamber of Commerce interested. At last a bill was passed by the National Congress, giving the City of Chattanooga the right to dam its river, improve navigation, generate electric power. The bill provided that if the City Government did not, within three months, exercise its option to build the dam, then the right to do so (with their own money) reverted to J. C. Guild and his local associates.

The City Council turned a cold shoulder to the proposition. They could not, they said, risk the people's money in such a venture.

Mr. Guild was still willing to take the risk. But where could he get the necessary millions? Where did he turn?

Mr. Guild, though not himself a rich man, enjoyed the confidence of investors in the great financial center of the country, New York.

And Wall Street (represented by the late Anthony Brady and others) listened to the story of the man from Chat-

tanooga. "Yes," they said, "we will go along with you. Your plan seems likely to succeed. We are willing to take the risk."

So the $3,000,000 was raised. Mr. Guild and the others of the small Chattanooga group put in what they could, to sink or swim, but the great bulk of the $3,000,000 came to Chattanooga from Wall Street. Of course, the Wall Street investors were not actuated by philanthropic motives. They sent their millions to Chattanooga to invest in a new and untried business that might succeed and might fail. If it failed it was their loss; if it succeeded, they thought, and had a right to think, it would be their gain. They believed in their Government and they believed that their Government would protect them in their right to enjoy their profits if any profits should result. For the purpose of raising this money, Mr. Guild organized a holding company.

This holding company also, by successive mergers, became a part of the Commonwealth & Southern system.

Men of like vision and enterprise of Mr. Foote and Mr. Guild and Mr. Lay organized similar holding companies in Georgia and Ohio and Illinois and Indiana and all of them organized holding companies which had headquarters in New York for the purpose of raising money in the money market of the country. In 1929 the security holders of these various companies determined, in accordance with the rule as old as the principles of commerce and investment, that geographical diversification was a great and necessary factor to the stability of their securities. Consequently, by exchange of securities out of which not one man made or took a dollar, they combined their respective companies into The Commonwealth & Southern Corporation. That corporation has outstanding approximately $52,000,000 in debentures, $150,000,000 in preferred stock, the overwhelming percentage of which were issued for cash and the balance for property of equal value to the par amount of the securities issued. In addition, in 1929 at the time of the organization of the company, over $61,000,000 was paid into the company's treasury by the sale of common stock. Previous to the consolidation, over $27,000,000 had been paid into the treasuries of the predecessor companies for their common stock.

The headquarters of The Commonwealth & Southern Corporation, as were the headquarters of its predecessors, is located in New York—not because, as has been so many times inferred, in order that the company may be under the domination of bankers, but because one of its principal functions has been to get money in the money market of the country to send to the operating companies for the development of their property. In the course of the history of the company and its predecessors, it has thus obtained almost a billion dollars for the development of Michigan, Ohio, Tennessee, Alabama and the other states in which it operates. That money represents the savings and accumulations of over 300,000 people who are now security holders in the Commonwealth & Southern system residing in every congressional district and state of the country who had, in turn, sent their money to the money market for investment.

Much has been said about the milking of operating companies by the holding companies. As far as The Commonwealth & Southern Corporation is concerned, no more untrue statement has ever been made. The Commonwealth & Southern Corporation invested $96,000,000 during the last five years in the common equity of the operating companies although it already owned all of the common stock of such companies except in the case of The Tennessee Electric Power Company, where it owns over 98 per cent. It did not for this $96,000,000 investment, take or receive one additional share of common stock of such companies. Never in the history of The Commonwealth & Southern Corporation has it ever borrowed a dollar from any of its operating companies, nor has there ever been what is known as a horizontal loan between operating companies in the system, nor does the company collect any financing or engineering fees and it has always given to the operating companies the full benefit of any savings in taxes by reason of the filing of consolidated tax returns. In its gas and electric business, it has no intermediate holding companies.

In addition, by the introduction and the final passage of the T.V.A. act, $500,000,000 of operating company property of The Commonwealth & Southern system immediately adjacent to the T.V.A. Development, was rendered unable to presently finance itself. The market value of their senior securities (bonds and preferred stocks), all of which were issued after showings made to public service commissions, that an equal amount of money was being invested in the property at the time of the issuance of such securities, dropped almost $125,000,000 below the market price of such securities before it became apparent that the T.V.A. Bill would be enacted into law. It was obvious, therefore, that the operating companies in the affected areas could not finance themselves and during the last four years The Commonwealth & Southern Corporation has advanced to these units, for refunding and developing purposes, over $30,000,000. This $30,000,000, of course, is in addition to the $96,000,000 invested as has been described in the common capital of the operating companies since 1929. One of the great contributing causes to our ability to do these things for the operating companies has been the geographical diversity factor in our operations. When the banks of Michigan closed, the Consumers Power Company and other northern operating units had millions of dollars frozen, while southern and New York banks remained more solvent. During that critical period, by reason of its diversity factor, The Commonwealth & Southern Corporation was able to ship to Consumers Power Company and Michigan hundreds and hundreds of thousands of dollars in cash to keep the wheels of industry moving and its employees out of the bread line. The Commonwealth & Southern Corporation also loans from time to time to the operating companies their requirements of cash money on an interest rate of 5 per cent without commission of any kind calculated quarterly on the unpaid balance. It at all times keeps itself in adequate cash and government security position to meet such refunding and construction and other cash requirements of its operating companies. On these cash and government securities which it now holds for such purposes it is receiving an average interest rate of less than one-half of 1 per cent. Without charge or fee, The Commonwealth & Southern Corporation buys, when there is not a ready market, from its operating units bonds and other securities which they are required to sell for refunding and construction purposes at not less than the price fixed by the state commission. When the market for these securities becomes good, The Commonwealth & Southern Corporation sells such securities. If it sells them for more than it bought them for from the operating companies, it refunds to the operating companies the difference. If, on the other hand, by reason of market conditions, it is required to resell such securities for less than what it paid for them, then it

absorbs such loss. The physical value after depreciation of our properties far exceeds the total par and stated value of all of our outstanding securities and last year our operating properties earned an ayerage of 5.16 per cent on their property after depreciation. If there is anything unsound or unfair in our business practices, I am the first who wants to know it and I shall appreciate it if any member of this Committee will tell me in what respect our conduct constitutes milking the operating companies or is unfair or unethical business conduct or is detrimental to the welfare of the nation.

The supervision services, which consist of supervision operations, financing, issue and sale of securities, accounting and reporting, tax matters, insurance, rates, commercial and merchandising activity, statistical information, technical and engineering development and design, operating analysis and cost records, purchasing, etc., are supplied by a mutualized service company whose stock is owned by the operating companies in the ratio of the gross earnings of each to the total gross earnings of all. It renders service without profit to such operating companies at a fee based on the gross earnings of the group approximately sufficient to cover the estimated cost and any excess of fee remaining at the end of the year is turned back to the operating companies in the form of dividends.

Every official and employee of both the holding company and the supervising company, except those having to do with accounting and clerical work, are men who were brought to New York from time to time from the properties of the system because they were outstanding men and had demonstrated particular skill in the line of work which they were brought to New York to supervise. I do not subscribe to the prevalent belief of these days that it is a crime to be a native New Yorker, but whether it is or not, we are not guilty—we are all "boys from the country."

The directors of The Commonwealth & Southern Corporation are:

PRESTON S. ARKWRIGHT, Atlanta, Ga.—President of Georgia Power Company—

Mr. Arkwright was born at Savannah, Ga., is a graduate of the University of Georgia.

ALBERT C. BLINN, Akron, Ohio—Vice-President and General Manager of the Ohio Edison Company—

Mr. Blinn was born at Piqua, Ohio, and acquired his experience in the utility industry in various operating companies in Ohio, Georgia and Indiana.

ERNEST L. GODSHALK, Charleston, S. C.—Vice-President and General Manager of South Carolina Power Company—

Mr. Godshalk was born at Kulpville, Pa., is an engineer having graduated from the University of Pennsylvania, and acquired his experience in various utility operating companies in Pennsylvania and South Carolina.

JO. C. GUILD, JR., Chattanooga, Tenn.—President of The Tennessee Electric Power Company—

Mr. Guild was born at Chattanooga, Tenn., was an engineer employed in the construction of hydro dams on the Tennessee River and commenced his association with the company as resident engineer of the predecessor company to The Tennessee Electric Power Company.

DANIEL E. KARN, Jackson, Mich.—Vice-President and General Manager of Consumers Power Company—

Mr. Karn was born on a farm near Peru, Ind., and acquired his training in the utility industry in operating companies in Illinois and Michigan.

THOMAS W. MARTIN, Birmingham, Ala.—President of Alabama Power Company—

Mr. Martin was born in Scottsboro, Ala., practiced law in Alabama from 1901 to 1903 when he became assistant attorney general of the State of Alabama. In 1912 he became general counsel for the Alabama Power Company and since 1920 has been President of that company.

WILLIAM H. BARTHOLD (Supervisor of gas operations of The Commonwealth & Southern System)—Vice-President of The Commonwealth & Southern Corporation—

Mr. Barthold was born at Napoleon, Ohio, and was associated with operating gas utility companies in Indiana and Michigan.

JACOB HEKMA, formerly of Grand Rapids, Mich.—Vice-President of The Commonwealth & Southern Corporation, in charge of finance—

Mr. Hekma was born at Leens, Graningen, The Netherlands. He was engaged in the banking business in Michigan until he came to New York in 1905 to join the general staff of the predecessor organization.

TIMOTHY A. KENNEY, formerly of Jackson, Mich., with Consumers Power Company—Vice-President of The Commonwealth & Southern Corporation—

Mr. Kenney was born at Mechanicsville, N. Y., and was an engineer in the employ of operating utility companies in New York and Michigan.

ROSS S. WALLACE, Peoria, Ill.—President, Central Illinois Light Company. Born at Chattsworth, Ill., and acquired his experience in the gas and electric utilities in Illinois.

WENDELL L. WILLKIE, formerly General Counsel of Ohio Edison Company, Akron, Ohio—President of The Commonwealth & Southern Corporation.

EUGENE A. YATES, formerly Vice-President and General Manager of Alabama Power Company at Birmingham, Ala.—Vice-President of The Commonwealth & Southern Corporation—

Mr. Yates was born at Elizabeth, N. J., was an engineer in charge of railroad construction and also chief engineer for southern operating utility companies.

CLARENCE W. CLARK, Philadelphia, Pa.—Member of E. W. Clark & Company.

S. SLOAN COLT, President of Bankers Trust Company of New York.

WILLIAM H. HASSINGER, Birmingham, Ala.

Seven of the fifteen are the chief executives of the operating companies and five are active executives of the service and holding company devoting their entire time to the work of the operating companies.

These directors and officers, despite all the insinuations and inferences to the contrary, direct the company's affairs without interference or control or suggestion of either by any other corporations or individuals. As long as they direct the affairs of the company properly, no 5 per cent ownership of the common stock by the United Corporation or Electric Bond & Share or 12 per cent ownership of such common stock by the American Superpower Corporation can displace them or control them and when they do not direct the business properly, no such per cent ownership of the common stock can prevent their displacement. We take no direction from United Corporation—Electric Bond & Share—American Superpower—House of Morgan or any other corporation bankers or combination of bankers or financiers. As a matter of fact, I wouldn't know a member of the New York Morgan banking house if he walked unannounced into this room, unless I recognized him from the picture I have seen of him in the public press. All we use bankers for is to get their money. That banking control is one of those "Orphan Annie" "goblins will get you if you don't watch out" bedtime stories. It is one of the great American myths.

This great economically sound diversified utility system, the record of which and its deeds of accomplishment I have just described for you, was builded by the infinite toil and ability of men who have devoted their lives in good season and bad season to build a great utility system. 300,000 people have placed their faith in its officers and we are their trustees, and we have kept and are keeping that trust faithfully. Our rates are among the lowest in the country. Every year since the organization of the corporation, there has been a reduction in our rates. We have builded one of the greatest integrated generation and distribution transmission systems in the world in our southern companies and our Illinois, Michigan and Ohio are among the soundest and most progressive of the country's utilities. Yet the rec-

ommendations of academic theorists, brilliant though they be, who never operated or had any connection with the operation of any utility property or, for that matter, any other form of business, are that you sane and sensible men should dismember and dissolve this corporation and organization, depreciate its securities and turn its operating properties loose where they will be the ready prey of those who, with public money, desire to nationalize the power industry in this country. Sometimes in moments of cynicism and from the public utterances of some of those spenders of the taxpayers' money, I am tempted to believe that our crime does not consist in being members of an industry in which some alleged abuses were claimed to be practised in a time when all forms of business, including agriculture and small town bankers and merchandisers, were doing likewise, but that our crime is that we have survived and saved the operating company. Maybe if we had not invested an additional 96 million dollars in operating companies in order to make them stronger and advanced 30 million dollars to save the operating properties in the Tennessee Valley, we would not today be exhausting our energies placing our situation before you with reference to this bill.

First, if this bill passes, we will have three alternative courses:

First: We can follow the one suggested by Dr. Splawn, dissolve and disband our organizations before Oct. 1. In which event, we can probably sacrifice the common stocks and other securities which we own in the operating companies and realize enough money to pay off our debentures and have left some small amount for our preferred stockholders and nothing for our common stockholders.

Understand, in the absence of bankruptcy, we cannot compel the debenture or preferred stockholders without 100 per cent consent, which is impossible to obtain, to take anything but cash.

Second: The second alternative we can choose, if our counsel advises us, as they now do, that this Act is unconstitutional, is to test the Act. Apparently the young men who drafted it, however, likewise had some doubts about its constitutionality and anticipated this move. They provided that if we do not register under the Act, and file an agreement to comply with the Act and all rules and regulations thereunder, we will be subject to a $500,000 fine for violation of any provisions of Sections 3 (a) and (b). In these two sections there are at least ten specific provisions and perhaps, should they be considered more separately, a great many more than ten. The amount which we might be fined, should we continue in the normal course of our business in order to test the Act without registering and filing an agreement to comply with the Act, might run into millions of dollars.

Third: This leads to the third alternative; that is, registration and compliance with the Act. To acquaint you fully with the serious consequences which would be entailed should this alternative be adopted would necessitate my carefully analyzing this Act for you step by step. This I cannot do. However, I should like to call your attention to a few provisions of the Act which are sufficient to illustrate the unsound character of this Act in its reach for power and the subtle methods of destruction, to which we subject ourselves if we register.

1—When we register we are compelled to file an agreement that we will comply with all provisions of the Act and all rules and regulations of the Securities and Exchange Commission thereunder, without, however, in the language of the Act, waiving any constitutional right "or any right to contest the validity of any rule or regulation." I hope you appreciate the restricted nature of this exemption. It apparently does not apply to orders which may be unreasonable, unjust, or otherwise unfair. Thus we are coerced into agreeing to give up the right to have a review by a court of any provision of this Act or any order of the Commission which we think is unreasonable or unjust. If the requirement that we file this agreement was not intended to accomplish this purpose then I cannot see why it is included in the Act. (Section 4 (a) (1)).

2—We cannot issue any securities without eliminating any business practices which the Commission thinks are wrong. The term "business practices" covers practically everything that we do. This provision would make the Commission the president and the board of directors of every company issuing any new securities. Also, please observe that in view of the agreement which we shall have to file, to comply with all the rules of the Commission, we could not get any court review of an order of the Commission refusing to let us issue securities without the elimination of any business practices which the Commission thinks undesirable. (Section 6 (h)).

3—Should we be unable to or for any other reason fail to comply with any rule of the Commission with regard to divestment of securities, or should we be unable to pay our debts, a Federal court *must* appoint the Securities and Exchange Commission *the sole trustee and receiver,* to administer our properties. There are no rules for the guidance of the Commission in this administration and there is no time limit for the continuation of the administration by the Commission. Moreover, a reorganization plan cannot be worked out unless it has been prepared by or approved by the Commission.

Since most holding companies probably will not be able to dispose of their assets at sufficient consideration to pay off their outstanding bonds and preferred stocks within the time limit set by the Act, the Commission will probably be operating the preponderant part of the gas and electric industry of the country with the owners of these companies unable to make any move toward reorganization without getting the prior approval of the Commission.

(Please observe that the court *must* appoint the Commission as the sole trustee and receiver. The administration of an insolvent estate is traditionally a function for a *court,* not an administrative body whose major objective is to abolish and eliminate the companies whose assets it is administering.) (Section 10 (c) and (d)).

4—Irrespective of any failure to obey an order of the Commission or inability to pay any debts, we cannot make any move toward obtaining approval of our stockholders for a reorganization unless the reorganization plan is prepared or approved by the Commission. These prohibitions are so broad that it would practically paralyze the responsible management of our company or its counsel in attempting to work out a voluntary plan of reorganization to comply with the provisions of the Act or otherwise. (Section 10 (e)).

(The last sentence in this section "Nothing in this sub-section or the rules and regulations thereunder shall prevent any person from appearing before the commission or in court through an attorney or proxy," illustrates the fear in the minds of the drafters of the Act that the sub-section would prevent a company

from retaining an attorney to appear before the Commission or before a court with respect to any plan of reorganization.)

5—None of our operating companies can make any contract with or retain the services of any person, whether he be lawyer, engineer, accountant, banker, manufacturer, etc., unless such person complies with the orders of the *Federal Power Commission* with respect to filing of reports, keeping accounts, costs, competitive bidding, disclosure of interest, duration of contracts, etc.

6—Every affiliate, which would include any company which has a common director or officer with any of our public utility companies, has to keep its accounts and records in accordance with forms prescribed by the Securities and Exchange Commission. This requirement would undoubtedly cause many of our public utility companies to lose local directors who have substantial business connections, thus depriving the companies of the benefits of the sound judgment and business viewpoint of such men. (Section 14 (b)).

7—In those few cases where we still have a right to appeal to the court from an order of the Commission, the findings of fact by the Commission are conclusive if supported by evidence. In view of the dictatorial powers over finances, management, business practices, etc., and the keeping of accounts, records, etc., such a provision practically makes the Securities and Exchange Commission the Supreme Court since the exercise of judgment on most of the matters depends entirely upon the weighing of facts. (Section 23).

The Act also presumes to seek the physical integration of public utility operating companies. I cannot imagine how an Act could be drawn which would more defeat this declared purpose. Practically every major utility operating company in the United States has interstate connections. If the Act is constitutional in my judgment, its constitutionality is largely based upon these physical interstate connections. Also, a company which is engaged entirely in intra-state operation and has no physical interstate connections is not subject to the provisions of the Act.

We have in the South a great interconnected system of transmission lines connecting Georgia, Alabama, Mississippi, Tennessee, South Carolina and Florida. That great interconnected system was developed in the last several years as a generation and transmission unit. In the State of Alabama there were more favorable sites for the development of hydroelectric energy than in the other states. Consequently, there was builded more generating capacity in that State than was required for the uses of that State, but it was developed to be used by the entire system and today power flows out of Alabama all through the several states that I have mentioned.

Take, for illustration, Tennessee Electric Power Company—In this time of depression, operating all of its plants to their ultimate capacity, it could supply its own needs, but it does not today operate some of its plants, using the less efficient ones merely for stand-by service while it buys large quantities of power from the Alabama Power Company. What am I, as a representative of the common stock of the Tennessee Electric Power Company, to say to the directors of the Tennessee Electric Power Company when they say to me, when it becomes apparent that this Act is to become law: "We want to break the interstate connection with the Alabama Power Company in order to escape the rigors of this drastic law, even if it does cost us several hundred thousand dollars more a year to generate our own power and even though it will require a large capital investment to develop additional power facilities"? If it becomes apparent that this Bill is to pass, many operating companies will undoubtedly break their interstate connections. This will be the greatest backward step ever taken in the history of power development and integration. Any operating company which can escape the regulations of Title II of this Act by breaking its interstate connections, unsound from the standpoint of national economics though it be to do so, will be foolish if it does not, for otherwise these are some of the regulatory provisions which it will be subject to:

(1) Instead of being allowed to earn a return on the *value* of their property, as they can under state commission regulation, they will be permitted to earn only on what the Power Commission decides has been prudently invested in the property — maybe 10, maybe 20, maybe 30 years ago. (No. 211 (c)).

(2) They will be compelled to build *with their own money* any extensions to their plants or transmission lines which the Power Commission orders whether they want to or not; but if they do want to add to their property they cannot do it unless the Power Commission lets them. (No. 203).

(3) They will be compelled to serve as common carriers and permit the use of their transmission facilities by *anyone* upon reasonable request. The Act gives no grounds upon which they could refuse to carry the energy of someone else, so long as a "reasonable" request is made. (No. 202).

(4) The Commission can tell each and every one of them how they are to generate their power, the kinds of equipment they shall use, how much they shall pay for coal, how much they shall pay their employees and officers, etc. (Nos. 209, 210).

(5) The Power Commission not only may say how they shall keep their accounts but can make them change, modify or alter any entry already made in their accounts. (No. 301).

(6) The Power Commission can refuse to let them abandon any of their property. This means, for example, that if a company wants to retire a standby plant, which it might not consider worth the cost of maintenance, it could not do so without getting a certificate from the Commission. (No. 204).

(7) If the Power Commission finds that they have been charging rates which are too high, any customer or customers may make a complaint and the companies will have to refund all charges in excess of what the Commission decides would have been a reasonable charge for the preceding two years. This would be a constant bludgeon over the heads of these operating companies. United action by any group of customers might possibly compel a refund of millions of dollars. A company may have been entirely innocent and not have known that the charges it was making were unreasonable but this would make no difference. (No. 213).

(8) The Commission can compel the company either to build facilities, or use the property of some other company, for serving a new territory which it might not want to serve and which it might, in its judgment, think is an unreliable territory to serve. The Commission can make a company give up a territory which it is serving and has been serving for years, and turn the territory over to some other company. (No. 203).

(9) They will have to file all periodic and special reports, and even minutes of stockholders' meetings, etc., with the Power Commission, *all of which are available to the public,* and in the event that any statement in any of these multitudinous reports should,

upon hindsight, turn out to have been misleading, the company and all officers participating in the preparation of any such statement might be subject to drastic civil and criminal liabilities. (No. 303).

(10) The companies on appeal from orders by the Commission will get no review of the facts. Thus they will have lost the right granted by 43 of the 48 states of the union to have a review of facts where they claim rates fixed by regulatory commissions confiscate their property. (No. 310).

(11) They will be subject in many respects to both State and Federal regulation with its inevitable conflicts resulting in confusion and harassments.

* * *

Do you realize what effect this Bill, if passed, will have upon the economic and social welfare of the country?

As regards the part of the Bill dealing with the holding company, it will destroy the very instrumentality by which the use of electricity has been made more dependable, economical and efficient, and more widespread in this country than in any other country in the world. In addition it will destroy or greatly impair the value of investments now held by millions of men, women, children, colleges, hospitals, churches and the like throughout this country. Its deflationary effects will be felt for years, and the discouragement and warning which such legislation will give to *all* holding companies, which are for the most part an essential part of our industrial life, will be incalculable in its effect. This country and its people cannot be governed by general prohibitions, but should be governed by reasonable regulation with the prohibition of specific "evils." Reasonable regulation of the holding companies to prevent the recurrence of the specific evils of the past is not only sensible but desirable, and is shown by our past legislative history to be the only way of remedying the evils which may exist in the present system.

So much smoke has been sent up with regard to the proposed legislation destroying holding companies that I want to be sure to make absolutely plain to you gentlemen the effect of Titles II and III of the proposed Bill. These affect primarily the operating companies.

The drafters of this Bill were not satisfied to destroy the holding company, but having done so and having separated operating companies into a number of comparatively weak units, they propose that the Federal government should step in and take over the regulation which has been so long and satisfactorily carried on by the states so that in a very short period of time a great bureaucracy in Washington will be regulating the internal affairs of practically all of the electric utility companies in the United States.

The result contemplated by the Bill far outreaches the popular concept of government ownership. From the time of the adoption of this Bill the Federal government will be in effect the supermanager of the affairs of most operating electric utilities. This in effect is government ownership without the necessity of paying to the owners of the property any compensation. It is management by the government of the affairs of these utilities without responsibility for the mistakes that may be committed.

This implies that political management is more trustworthy and more beneficent than private management in business, and that as government swells to omnipotence its citizens will be happier and richer. These two propositions are exceedingly doubtful. For my part I cannot find proof of them in history from Sparta of old to Soviet Russia of today; and I regard it as certain that the history of advancing liberty contradicts them both. No one doubts that sin exists, that greed and injustice have deep roots in the dispositions of normally immature man, and that social control is necessary in industrial and even in ecclesiastical organizations in order to protect us from these dangers. But most decidedly governments as well as individuals are to be numbered among the sinners and self-seekers. This programme of reform seems to be dominated by the incredible superstition that government is exempt from the moral frailty of individuals, and that industry will be cured of its ills once bureaucrats take charge of it. What record of historical experience supports such a belief? Is it a reasoned principle or an ecstatic credulity? This anyhow must be admitted that the immense enterprises to be handed over to bureaucrats were not created by bureaucrats. And I leave it to the students of social history to decide whether the evils of excessive profit-seeking in industry are not more easily curable than the evils of excessive power-seeking in government.

Dr. Splawn, however, in his anxiety to prove that we should be dissolved, places it upon the ground that the utility business is a local business and therefore should not be under the ownership of holding companies. It is certainly no more local than the newspaper business.

The great newspaper chains in this country, in my judgment, have rendered an immeasurable public service through the common ownership of a large number of local newspapers. They have thus created a greater facility for the dissemination of news and the elevation of the standard of public information. Diversity, centralized control, continuity of management have all contributed enormously to this success and public service.

These units, as well as the great centralized publishing houses, operate exactly on the same basis as we operate; namely, a holding company which issues securities against common stocks of underlying operating corporations which in turn have outstanding senior securities.

Is it any greater crime for me, with my associates, to represent a utility holding corporation with offices located in the money market of the country, in order to obtain money for operating companies, which by the very nature of their business they are constantly in need of, than it is for the operators of a great newspaper holding company to have offices in the same city which is likewise the news as well as the financial market of the country, in order to secure for their operating units these two indispensable necessities to their existence. I could cite you an infinite number of examples of other types and kinds of business operating on exactly the same kind of basis and I only mention newspapers because Dr. Splawn placed such emphasis on the local nature of our business.

Judge Healy, on the other hand, says holding companies in utility industry should be abolished because utilities are monopolistic. This may be an excuse but is not a reason. There is not an exclusive franchise in the Commonwealth & Southern system and any of you men could as readily establish a competitive electric utility in any town in which we operate as you could establish a competitive newspaper.

Over 80 per cent of the larger corporations functioning in America today are holding companies. The Federal Trade Commission indictment is not an indictment of the utility holding company or the utility business. It is an indictment of a system of business. It is also an indictment of an economic

period. The practices of utility holding companies complained of occurred prior to 1929 and were common practices of all forms of business at that time. When I speak of business, I do not speak solely of the large corporation or the Wall Street speculator. I speak equally of the corner grocer, the small town manufacturer and the farmer.

Before adopting the death-dealing remedies suggested, it might be wise to consider the problem from its business as well as its legal aspects. Much has been said about the necessity of the regulation of interstate transmission of electric energy. There is no stream of current throughout the nation. In the great majority of cases electric energy is never distributed beyond a state adjoining the state in which it is generated. The actual figures for the year 1933 may be helpful to you.

1. The total number of kilowatt hours generated in the United States was 79,259,000,000 kilowatt hours.

2. The total number of kilowatt hours distributed outside the state in which it was generated was 14,146,000,000 kilowatt hours. Thus, only 17.8 per cent of the total amount of electricity generated was transported across state lines and distributed outside the state of generation. (For your information this percentage for the year 1934 was 17.5 per cent.)

3. Of this limited amount of current distributed in states other than the state of generation 13,317,000,000 kilowatt hours or 94.2 per cent was either transmitted and distributed by the companies by which it was generated or purchased by the distributing companies from companies with which they were affiliated.

4. This leaves only 829,000,000 kilowatt hours or only 1 per cent of the total of the kilowatt hours generated in the United States which were purchased by the distributing companies from non-affiliated sources outside the state of distribution, and this percentage is really the percentage which is the only proper subject of Federal inquiry or Federal legislation. For, as I intend to point out to you, only this small percentage is beyond the field of regulation and control by the state in which the current is actually distributed.

And now let us consider the present state of the law, the greater part of which is of comparatively recent development, as applied to the facts of the industry. The Supreme Court of the United States has laid down very definite rules defining the rights of the individual states to control the industry and to protect the consumer.

A. The generation of electricity has been held to be intrastate and subject to regulation (taxation) by the state in which the generating plant is located, even though the electricity produced is automatically transmitted in interstate commerce. (*Utah Power & Light Co. v. Pfost,* 286 U. S. 165 (1932).)

B. The distribution of electricity to the consumer has been held to be intrastate commerce and subject to the regulation of the state in which the consumer receives the electricity; and this is true even though the power is produced by the distributing company outside the state and imported for the purpose of distribution. (*Pennsylvania Gas Company v. Public Service Commission of New York,* 252 U. S. 23 (1919); *East Ohio Gas Co. v. Tax Commission of Ohio,* 283 U. S. 465 (1931)).

C. The charges paid by the distributing company to an affiliated source for services performed in the course of interstate commerce and for current received in interstate commerce are subject to the supervision of and rejection by the regulatory body of the state in which the distributing company operates. (*Smith v. Illinois Bell Telephone Company,* 282 U. S. 133 (1930); in *Western Distributing Company v. Public Service Commission of Kansas,* 285 U. S. 119 (1932)).

D. This leaves only 1 per cent of the total generated electric output not subject to effective state control. And as to this 1 per cent there is obviously little need for regulation. Common business judgment should direct the local distributor to make the best bargain possible with the unrelated producer and to secure the best rate the market offers. But if the commercial instincts of the management should not be thought to afford sufficient protection to the ultimate consumer, there is the further safeguard in the power of the state commission to disregard excessive operating expenses in fixing the rate to the consumer. (*St. Joseph Gas Co. v. Barker,* 243 Fed. 206. See also *Chicago & Grand Trunk Railway Company v. Wellman,* 143 U. S. 339.) If, on the other hand, the costs were not demonstrably excessive and the contract was made in good faith, a federal commission or regulatory body would have no more authority to override the business judgment of the management in making the contract if an interstate rate, or charge, were involved, than would the state commission in case of a state rate.

You will note that the clarification of the law has been comparatively recent and I think it significant to realize how the development of State regulation has synchronized with this clarification. Since the Supreme Court decided the Illinois Bell Telephone Company case in 1930 an extraordinary development has taken place in the effectiveness of state control over public utilities, in the fields both of legislation and also Commission action. Under that decision the State Commission in *all states* may now and actually do investigate, ascertain and arrive at the costs of supervisory services and wholesale gas and electricity to the operating companies within their borders for the purpose of regulating rates. In addition to this type of control, however, a number of states go further under legislation adopted in large part since 1930, and actually control intercompany contracts and arrangements themselves.

Legislation providing for regulation of contracts or arrangements for management, service, sales of equipment and the like between local operating companies and affiliated companies has been adopted by no less than 21 states. The degree of statutory regulation therein varies from a mere requirement of filing to complete and continuing control by the State Commissions over all such contracts and arrangements and payments made thereunder. Generally, the Commissions are given power to declare such contracts or arrangements invalid if they are found unreasonable or not in the public interest, or in the case of the New York Statute, if the charges made by the affiliated company exceed its reasonable cost.

In addition, a number of states have adopted laws designed to aid their Commissions in eliciting information from holding and affiliated companies which are outside their particular jurisdictions. The scope of these statutes varies in different states; the most common provision requires full disclosure of information with respect to stock ownership in the operating utility company while many states go to the extent of permitting the Commission to make complete investigations of the books, records and accounts of the holding and affiliated companies.

Another recent subject of state regulatory legislation is loans and advances by operating utilities to their holding and affiliated companies. Since 1930 ten states have passed statutes requiring

Commission approval of all loans or advances by an operating utility to affiliated interests.

Recent statutes have also been adopted in several states regulating payment of dividends by public utility companies and in five states the Commission is given authority, under certain circumstances, to forbid the payment of dividends by public utility companies.

Nearly half the states have enacted laws, many of which have been in existence for a considerable time, whereby the various State Commissions are given control over the acquisition of public utility stocks by other corporations and several of the more recently enacted of such laws deal in terms with the acquisition of operating company stocks by holding companies.

It would not be appropriate for me at this time to go into greater detail with regard to the recent advances made by the State Legislatures and Commissions in achieving effective regulation over all phases of the public utility companies operating within their borders, including particularly their relations with affiliated and holding companies. A detailed examination of the more recently enacted statutes would, I am sure, demonstrate even more clearly than the foregoing brief recital that effective state regulation can be, and in some instances at least, has already been achieved.

I have discussed with you so far, the question of the relationship of the proposed Bill to the consumer and the lack of necessity, perhaps the lack of power, for Federal regulation (except perhaps at the expense of the complete destruction of all state commissions) to protect the consumer. But, as you may say, even though the condition of the law and the statutes of the states are now effective to prevent the utility companies from inflicting exorbitant rates on the consumer, there is still the problem of protecting the investors in the securities of utility companies.

In the first place, a great majority of the states, through their own regulatory bodies, regulate the issuance of the securities of operating companies, both with a view to protecting the consumer and the investing public. In addition, Congress in recognition of the fact that the great bulk of security sales takes place by the use of facilities of interstate commerce, has very thoroughly and exhaustively provided for the protection of investors in all classes of securities—securities of public utility operating companies and public utility holding companies, as well as of other companies—by the enactment of the Securities Act of 1933 and the Securities Exchange Act of 1934. Under the Securities Act, the sale of securities of public utility operating companies and of public utility holding companies is in reality only possible if the proposed sale of securities is registered with the Securities and Exchange Commission under the Securities Act. Not only does such registration require a detailed account of the history and financial set-up of the company proposing to issue the securities but, what is particularly significant in our present discussion as to Federal regulation of public utility operating companies and public utility holding companies, such registration requires a full disclosure of the relationship between the operating company and the holding company, of the personnel of both companies, of the stock ownership of the parent in the subsidiary, of all management, service and construction contracts between affiliated companies and of all material contracts between the affiliated companies which, in the case of public utility companies and affiliates would undoubtedly include contracts for the purchase and sale of wholesale power.

Moreover, when we consider that practically all of the public utility holding companies are listed on some national securities exchange, we realize that under the Securities Exchange Act of 1934 effective machinery has already been established by the national government to protect future investors in the securities of holding companies and their subsidiaries—whether such securities are already outstanding or are issued in the future. These companies are required to file with the Stock Exchange and with the Securities and Exchange Commission complete information as to the history and financial set-up of themselves and their subsidiaries, the relationship between the holding company and the operating company, the management, service, construction and other material contracts between the holding company and all subsidiary and affiliated companies, the important employment, bonus and salary contracts of the chief employees and the write-ups and write-downs since 1925 in the property, plant and equipment accounts of the parent and of the subsidiary.

Moreover, the Securities Exchange Act has provided effective machinery to prevent the manipulation of security prices, the abuse of proxies in the conduct of stockholders' meetings and the making of profits by directors, officers and principal stockholders of companies through the unfair use of information with respect to their companies. Moreover, as to any of the operating companies whose securities are listed on any such exchange, not only are the officers of the operating company held responsible for any failure to comply with the Act but the holding company that controls any such operating company is also subjected to liability.

I dislike to make personal references but let me say to you that I am as anxious as you can possibly be to prevent the recurrence of abuses in this great industry. Likewise, if there are any gaps between the regulatory powers of the states and the regulatory functions of the Federal Government, I am as desirous as you to stop such gaps in order that the clever and the wily may not slip through to bring down upon this great industry once more a flood of criticism such as we have been subject to in the last few years.